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F. R. Forsberg

Collection and Field Note Book

No. 43

(March 11, 1956 --- April 19, 1956)

(36739 --- 36924)

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Netherlands

March 11 - flight from London to Copenhagen -

Coast of Netherlands in area before reaching former Zuiderzee -

Dunes a very small area with some apparently evergreen vegetation - this very sharply demarcated.

A river with protecting jetties at mouth. A town ~~on~~ east of it. Back of this polder.

Northeast of this a fairly large area of what seems to be salt marsh or a tidal marsh with considerable areas of water.

Then vast areas of polders. Water surface in polder areas surprisingly large - canals quite wide.

Soil black. Cultivation drab.

Drainage of Zuiderzee not at all complete. Large areas still under water but also fairly extensive relatively recently exposed flats not as yet occupied agriculturally.

Polder pattern - long rectangles oriented roughly perpendicular to coast.

1956 Netherlands

Houses scattered along main cross-canals and dykes. Also in villages.

Vegetational successions on recently exposed areas in Zuider Zee would be interesting. Varying degrees of darkening of white sand apparent from high altitude.

Eastward from Zuider Zee the polder pattern becomes less and less regular, with blocks of polders at varying angles.

To the east of the polder land, ~~is~~ perhaps, but not certainly, near Emden, Germany, is intensively cultivated land above sea-level.

Clouds then cut off visibility.

Friesian Coast - much low-lying land, completely under cultivation. Plots drab colored & black - those plowed apparently black. Roads separating them are mostly white some obviously from packed snow but others possibly sand.

No snow on fields but much floating ice in coastal waters.

Almost no streams in coastal area but some very small ones and a few conspicuous ones a few miles inland. Some of these appear much larger than they are because of broad meandering strips of bottom land, some of it cultivated, some not, along their courses.

Inland the fields are more and more conspicuously outlined by bands of snow, these, for some reason (probably drifting by east winds) around the insides of west boundaries extending but diminishing eastward along north and south boundaries. Shapes of plots becoming more irregular across Jutland south of Flensburg.

a band of floe ice along the shore east of the isthmus, quite wide in places. Some bays partly frozen over. Ice between Fünen and small islands west of it mostly frozen over. These small islands entirely cultivated except for small marsh areas around ponds or lakes. Soil black. Plots irregular. Ice between islands broken into vast slabs of irregular size and shape. Some areas completely shattered. Much ice to south of Zeeland. This generally more broken up than that farther west.

Western part of Zeeland like islands but cultivation pattern becoming more regular eastward. General color drab with shadings of green. Eastern 2/3 of island lightly snow-covered, more so eastward. Soil black where exposed. A few patches of forest there, apparently deciduous, smaller areas of conifers, these

as angular patches within the larger angular patches of deciduous forest. Forests of irregular distribution probably not 2% of total area seen but locally forming a large part of the terrain. Eastward toward south of Copenhagen the proportion of coniferous patches in the forested areas increases, locally to perhaps half.

Much ice on east coast of Zeeland. Snow gets lighter again here. Farms here seem to have many small ponds, frozen and snow-covered now, of course. Along the coast an area that may be either lagoon or marsh protected from sea by offshore banks.

Heavy floe-ice southeast of Copenhagen. Between this and shore are concentric bands of a bright green bloom which extend some hundreds of feet out from the shore.

Along the shore at the airport are small patches of Phragmites communis. The airport, off the concrete runways, is covered by a very short grass, drab in color now.

1954 Switzerland

Mar. 14 - Zürich to Rome flight.

Neighborhood of Zürich airport pasture with short drab grass, patches of it plowed, patches of woods - oaks, spruce, elands, & mixed

In some of the pasture are abundant small mounds of earth very much resembling those made by pocket gophers.

Around the lake, in Zürich are thousands of gulls - small, almost white with black heads.

A vast expanse of the higher Alps entirely snow-covered, peaks and valleys, incredibly rugged.

On the Italian side the snow gives way to straw-colored higher slopes and ridges, darker steep slopes below with woody vegetation. Lakes Lugano, Como, Maggiore quite blue.

Agnon

The Po Valley intensively cultivated. The Po meandering through the flat valley with a broad sandy bed.

Hills at head of south tributaries, north of Genoa, are a dull brown in color, not at all green.

Arid near coast n. of Lake Bolsena brownish but showing some green. Hills between there and Rome completely snow-covered.

15 - 20 min. n. w. of Rome.

Very little forest - what there is shows up black

Approaching closer. The broad valleys & with meandering rivers lack snow, the hills have it. Then, near Rome, it completely disappears.

Landscape south of Rome near airport is almost treeless except for a few clipped evergreens along the roads and some trees in villages. A few deciduous trees also along roads all land cultivated even in villages. Cultivated land turning green, soil red or reddish. Higher hills to east snow-covered.

1956 Italy

Mar. 14 Flight Rome to Athens

Along the coast southeast of Rome are several large blocks of forest, some of it evergreen, some deciduous with some admixture of evergreen.

Mar 15 - Flight from Bombay to Colombo 15000' 1075 mph 1 hr 10 m

Hills around Bombay and southward dry and brown except for scattered palms and other trees and bushes. Some of them, to the south, seem scrub-covered with bits of thicket and forest in some ravines and valleys.

Lowlands, flat or gently rolling, between the hills seem all under cultivation, marked by hedges in some places, others not, but are all extremely dry. Thin mangroves on mud flats in estuaries.

First half hour south along coast - hills and entire coastal area look very dry and brown, but scattered trees, more abundant in ravines, and a few small patches of wood are green. This coastal area does not seem at all thickly populated after vicinity of Bombay is left behind.

Occasional white sandy beaches, backed by green

vegetation, but in most places the brown hills come directly down to the sea, usually ending in low bluffs.

To leeward south - soil definitely reddish. Seems a rather drowned coastline, judging by number of rather complex estuaries. Stream valleys abruptly cut in ~~to~~ what appears to be an elevated coastal plain. These valleys greener than intervening sections of elevated plain, but not really very green. It seems that herbaceous vegetation is all ~~green~~ while woody vegetation is green.

Land forms during next
7 - 7:15 15 minutes very interesting - sharp headlands abruptly interrupting sand beaches. Steep wave-cut bluffs around these headlands and sections of coast lacking beaches. Valleys here apparently have considerable population but elevated plain very little. Light green which could be sugar cane (or rice) at 45 min. Estuaries become more numerous but mostly with

abrupt sides, relatively little mangrove except for a few bays. Patches
7:15 - 7:20 of woods on slopes of ravines, some ravine well marked by woods.
7:20 Patches of light green - sugar cane, becoming more numerous in flat bottoms of valleys.
7:24 areas of moving dune sand. Attempts to control them by planting trees. Long sand spits deflecting some river mouths southward. Belts of woody vegetation back of beaches may reflect advance of sandy areas toward sea - cutting back of higher land and its replacement by sand.

Peculiar alternation of ~~short~~ pointed headlands with beach continues with beaches forming greater part of coastline.
7:30 General coastline rather straight, except for these small pointed headlands and the numerous estuaries.

Sugar patches more numerous.

Patches of woods also becoming more numerous and larger.

Area back of beaches
wooded. Elevated coastal
plain lower. Large patches
2:34 of wood occasional on it.
otherwise it is still drab
a reddish in color.
Goa. - large estuary.
Country generally more
wooded here, but fields
and open land drab.
Long straight beach some
miles long south of Goa. Some
loose sand behind it, partially
tree or shrub covered. Then
another estuary with
sugar cane. Then a few
low small islands offshore.
2:35 - Country becomes rougher
2:45 and hills scrub covered.
Then hills seem wooded
with drab fields on
more level places.
Many large estuaries.
2:50 Lower country and again more
open and brown. Many and
complicated estuaries.

2:51-3:04 Coastal plain becomes
lower and more naturally
eroded. Southward
more and more interrupted
by low rounded hills
which are green with
reddish soil showing

through. Estuaries and
flat fields between
them. Some fields are
drab, others low and
bright green - rice?. F
small patches of wood
and clumps of trees
abundant.
3:00 - The small hills
3:10 become so abundant
that they make up most
of the country. Their
tops are in places
bare and red, probably
badly grazed. Several
winding estuaries
between them. Cultivated
3:10 land between the hills
becoming divided into
small lots separated
by hedges & strips of
vegetation, at least. This
area rather densely populated.
Drab color of fields evidently
stubble & grain - at least
all hills between are red.
Soil in these fields, though,
may be gray-brown, as
suggested by some that
seem to be plowed.
3:12 Many fields green,
especially near stream
courses.

3:15 two large estuaries heading up into meandering sandy beds. Separated by complex of thinly vegetated red hills with fields, green and drab, and patches of wood between them. Extensive offshore banks at mouths of estuaries. A city at mouth of south one of the two.

Then a long, almost straight, slightly echelon beach southward for miles, some dark vegetation at top of beach, then narrow strip of green fields. Then back of this the same complex of low rounded reddish hills, here thinly & scarcely vegetated, with fields and patches of woods between. Some small

3:30 estuaries southward, mouth deflected by long sand spits. Deflection southward but actual opening north of southern end of sound in each case. Then one with mouth deflected northward in same manner, this a fairly large one.

3:37 South of this the dissection

becomes obscure and the land back of the coast is largely a rolling red plain, cut by fewer ravines. Vegetation very thin, but with woods in low places and along ravines.

3:45 Just south of this a broad sandy coastal strip in front of the slightly elevated plain. Sandy area cultivated, with strips of trees (wind breaks?) parallel to beach.

Then long stretch of sounds, cut off from sea by long spits & bars. This backed by rather low coastal plain, this wooded in strips parallel to coast, rather irregularly, cut somewhat by winding estuaries. This ends

3:57 southward in a hook-like hilly headland pointing somewhat southward, with again a long beach south of it in a conspicuous echelon arrangement. Large estuaries and sounds here also, but visibility now very poor. This is probably about Cannanore

1956 India

followed by Tellichery and Make, but plane is too far offshore for good visibility. There are red hellands and estuaries, with more
3:33 vegetation than northward.
As far as can be seen the coast is predominantly wooded from here on.
Make is perhaps the dividing point between a dry and a humid coast.

3:43 Approaching coast again somewhat - visibility poor. Landscape again somewhat dry, but with considerable expanses of forest.

3:57 Long straight beaches, backed in place by dark vegetation, in places by sounds ~~Rocks~~ Backs of this coastal strip a hills with large areas of green (rice) between them, some woods, some open brown grass or hills.

4:10 Approaching coast again but visibility very poor a gray-blue haze. Evidently long offshore spits and extensive sounds, but details not clear.

Apparently this is Cochin (Malabar).

4:25 Southward a low coastal area, partly under water(?) partly cultivated. Inland apparently some open sand, partly vegetated, but this not clearly visible.

4:37 Large densely cultivated coastal plain area, considerable vegetation. Large lake inland from this (~~to~~ Vembanad?) and inland from that extensive flat area, cut into large angular blocks, some flooded, some brown with scattered green patches, separated by broad canals and estuaries. These blocks apparently cultivated, as they are subdivided into rectangular patches.

4:41 Southward and ~~then~~ lake apparently divided into fish ponds, with a town on an island in it. South of this an intricate mosaic of patches of trees and of cultivation, ~~to~~ to east wide green fields (rice?). Southward this pinches out - coastal plain is trees and cultivated patches.

1956 India

in a rather regular north-south pattern. Some canals and roads following this pattern. Trees more abundant southward.

4:15 There patches of trees not dense - some ground to be seen between them usually. Soil drab to reddish, becoming redder southward. Then more estuaries and the north-south pattern breaks down, becomes irregular, with plantations - grid-arranged, of something (rubber?) and then a large irregular

4:17 lake. Then red soil, rolling, with winding strips of flat light drab soil - old estuary courses? The whole sparsely and very irregularly tree covered with many patches of cultivated land.

4:20 Large estuaries and coastal lakes, completely separated from sea by spits or bars - no opening.

Country generally red, with some vegetation, except for drab open meanders and shores which are flat and treeless.

Beach very straight for miles, in places backed by water, in places by what appear to be scrub or low forest.

4:23 Then a broad sandy (?) apparently unvegetated and perhaps partly cultivated, back of beach. Back of this a complex of red low rolling land with meandering flat dry estuary courses - the red soil thinly vegetated with woody plants, the meanders drab, dry grass or cultivation.

4:26 Then this complex comes immediately to the coast and the coast turns very slightly more eastward, is predominantly wooded with red hills showing through to some extent. Then another long straight beach. The same pattern (4:20-4:26) repeated somewhat, but with not so much flat coastal strip, & red hills closer to coast. Meandering flat valley bottoms, drab in color conspicuous between them.

4:30 Hills come down to coast again and another gradual bend eastward.

but beach is continuous.
The sparse vegetation of these hills looks very over-grazed.

4.33 a town, and patches of more dense wood and open scrub areas back of coast.

4.35 Then a low, like headland with a town, again the coast trends more east, followed by a long broad straight beach. Back of this much open grassy and scrubby country, some cultivation. The red hills gone or obscure.

4.37 A sharp bend eastward followed by an irregular coastline.
To eastward broad red plains with a few scattered dark spots of vegetation as far as visibility goes.

(All changed on another course)

In distance a sharp low hook like point followed by another sharp bend and an irregular coast trending northward (?) (navigator not certain if this is Cape Comorin or not!)

Mar. 15 - Colombo area almost solidly planted to coconuts. Planting varies in regularity from patch to patch. Some rice fields also. Some other trees mixed with coconuts. A few patches of woods without coconuts. Rice in various stages - some has been harvested.
Pandanus and Acrostichum on low wet ground near airport.

March 16 - Colombo
Rocks at Mt. Lavinia hotel covered by a short growth of algae - Ulva.
Crows abundant, dark gray.
Cultivated plants seen in Colombo:

a Cocos nucifera
c Poinciana grandis var. alba.
o Delonix regia
c Erythrina variegata var. orientalis
~~o Gliricidia maculata~~
~~c Dianthus caryophyllus~~
o Cassia fistula
c Plumeria rubra
c Plumeria sp. "Singapore"
c Casuarina equisetifolia
c Artocarpus altilis
o Lawsonia alba

1956 Ceylon

o ~~Gladiolus~~
c Codiaeum variegatum
o Gliricidia sepium
c Mangifera indica
c Eucalyptus tereticornis
c ~~Antholiza aurea~~
c ~~Gladiolus Colvillei hybrid~~
c Thespesia populnea
c Pseuderanthemum carruthersii
o Bougainvillea glabra
c Bougainvillea spectabilis
c Carica papaya
o Hemigraphis repens
o Ipomoea carnea
o Polyscias fruticosa
o Mussaenda calabura
c Hibiscus - ornamental hybrids
o Malvaviscus sp.
c Chrysalidocarpus lutescens
c Tabernaemontana coronaria
o Ptychosperma macarthurii
o Ruellia diversa
o Cycas circinalis
o Cycas revoluta
c Caesalpinea ~~spp~~ pulcherrima
c Acalypha wilkesiana v. wilkesiana
c Agave sp.
o Codiaeum - ornamental hybrids
o Ficus religiosa
o Nerium oleander
o Thevetia peruviana
o Dracaena sp. (red purple)
o Euphorbia pulcherrima
o Ipomoea sacta

o Polyscias trinocblata
c Allamanda cathartica v. hendersonii
c Dieffenbachia maculata
c Coleus scutellarioides
o Euphorbia "splendens"
o Caladium bicolor
c Musa sapientum
c Catharanthus roseus
c Polyscias filicifolius
o Pseuderanthemum carruthersii
v. atropurpureum
o Adiantum sp.
o Nephrolepis sp.
o Thunbergia ~~sp~~ erecta
o Ixora casei
r Ixora alba
o Manihot esculenta
o Ceiba pentandra
o Tamarindus indicus
r Cyanthidium sp.
r Barringtonia asiatica
o Tagetes sp.
c Lantana camara
r Lectuca grandis
o Terminalia catappa
c Artocarpus integer
l Strobilanthus? (salmon color)
r Peronia grandis v. grandis

1956 Ceylon

Colombo is, in general very well covered by trees. Most of the city, except the down-town or "Fort" area and the actual water-front and railway yards and market area looks green and wooded from the air.

1950 Ceylon

Mar. 16 - rail trip from Colombo to Kandy

Flat country outside Colombo - open low pastures, some cultivated plots, about 1-3 dm above water table. Ponds with a small pandanus and Hibiscus tiliaceus. (P. zeylanicus)
Home sites and small villages with coconut trees and other palms, Mango, breadfruit, jak, various other trees.
Extensive marshes with open water completely covered by an unidentified floating plant - brownish green, patches of Crinum, Cyperus, Nymphaea
Salvinia
Thickets with Carbera, Phoenix sp. Hernandia sonora, Lantana camara.

15 mi. ~~from~~ Colombo

Rice fields in various stages
A little Colocasia along edges.
Ragama sta.
Areca common. Rice fields.
Coconut groves.
Large hevea plantation.
Low rolling hills.

Plants lodging east.

Paturwatta sta.
Coconuts and mix. cult. trees on hilly ground, rice patches on flat low ground.

Ganemulla sta.
R.R. follows winding valley with rice patches bright green. Much very low rolling hilly country with houses, small patches of rubber, coconuts, ~~tobb~~ areca, Anacardium, Mango, Musa, Lesbania grandiflora.

Gampaha sta.
Carabao grazing in rice stubble fields, cattle also. Rice here all harvested.
Breadfruit occasional.
Rubber and coconuts occupy higher land almost equally.
Proportion of high ground and rice about equal.
A little bamboo.
Pandanus (?) along water courses.
Gliricidia common.
& large Caryota (urens ?).

Plants lodging east

Kelanawala sta.
country essentially unchanged, more coconuts, less rubber, perhaps more rice.
2-3 mi ~~from~~ Kel.) First real hills 5-6 m. away high, abrupt, covered, except cliffs, by woods, thickets and cultivation - mostly coconuts and bananas. Recent clearing and burning.

1956 Ceylon

roadside rubber plantation on left.

Miriyama Sta.
Country essentially flat again, but hills in distance.
Small patches of pineapple.
Much tangled second growth on hills. Rock exposures common. Some forest. Coconuts on lower hills. Much less rice. Coconuts here without undergrowth, cattle pasture

Ambepussa Sta.
Peltophorum in village.
Houses - larger roofed with tile, smaller thatched with coconut leaves. Mud walls.
Leave higher hills behind.
Little rice, mostly pasture.
Maha River

Bujjomuwa Sta.
Higher hills - forest on top, cleared on slope

Alawwa Sta.
Country more hilly
Exposed rock common
Mostly coconuts, no rubber
A little rice in flat bottoms

Polgahawela Sta.
First view of real mountains in distance.
More rice, all stubble but flooded. Higher ground all in coconut plantations. Steep mountains in distance on left wooded. Banana ~~common~~ abundant around dwellings. Papaya common, breadfruit occasional.
High hills, forested - to[illegible] clearings and second growth. Thicket on slopes. Mainly rolling low hills with coconuts. Still along Maha River.
Some rubber plantations again, not very large.
Areca common.
Bamboo still occasional, 2 or 3 kinds.
Same pattern of coconuts on rolling land, rice on flat bottoms, in patches bounded by levees.
5:1 mi. good view of mountains in distance on right, very rugged.
Rambukkana Sta.
Xanthosoma and Colocasia.
Rice all stubble.
Areca abundant.

1956 Ceylon

Enter mountains.
Slopes with mixed secondary forest and coconut groves. Artocarpus common, at least x cult.
Areca still very common, grow also bananas. Terraced rice in small valleys.
First patch of Imperata.
Ceiba pentandra in small patches.
Jatropha cercas hedges.
Some rubber, rather young trees.
Mountains in places very abrupt, others more gently sloping. Covered by second-growth forest, but with clearings and shifting cultivation even on steepest slopes and clear to tops. A few small areas of grass on some slopes.
Coconuts still very common, but not on highest places or steepest slopes. Breadfruit ~~rare~~ common also.
Alocasia in wet spots.

5.7 mi Scenery magnificent. Spectacular rice terraces.
Imperata rather common

Alagalla Pta.
Magnificent rice terraces here, compare very favorably with Bontoc. Walls of terraces held by a thin sod.
Themeda occasional.
Tithonia diversifolia well established along railroad.
Some rubber on even rather steep slopes.
61 mi. A giant bamboo here, not Semarea.

Balana Pta.
Mostly second growth with scattered small patches and clumps of bananas. Rubber on less steep land.
Rubber trees rather sparsely leafy at this season.
Still plenty of coconuts.
Citrus, breadfruit, mango.
Bare gray rock cliffs.
Some epiphytes in trees.
Slopes rocky. Much Imperata on soil-covered slopes. Gravilea robusta suddenly common, ~~accidentally~~ as tea shade; ~~as~~ tea plantations also appear here. ~~Kandy~~

1950 Ceylon

Kadugannawa Kta.
Some rice harvested, some almost ready.
Level valley between steep mountains. Slopes in tea. Bananas abundant coconuts less so.
Gerbera patches.
Bambos common, areca also, breadfruit. Gliricidia
Railroad goes downgrade from here.
Small herons common here, flying at sundown.
Coconut palms common locally.

Where slopes are too steep for tea terraces Tea is planted. Clean cultivation of tea seems to encourage erosion. Soil is red.
Streams are thickly beset by rapids.
Peradenya Junction.

May 19

Udawattakele Forest above Kandy — walk with C.H. Phillips

Forest of Artocarpus nobilis Ludekia macrophylla Pterocarpus dalbergioides Elaeocarpus spp. Artocarpus integer, Xanthoxylum indicum Myristica dactyloides, Macaranga peltata, Myrsoxylon peruiferum.
Covered by Leucopogon amens and another acrid in ground as well as on tree trunks

Regeneration of Ludekia is very profuse.
Tree to 6' girth in 35-40 years.

Calamus, Caryota

Macaranga and Trema are primary colonists in openings in Ceylon — Hobbs

Great numbers of fruit bats — eaten by some and believed to be cure for asthma
Small group of brown monkeys.
Fruit bats in pine trees where they roost. Eat Artocarpus and Trema.
Syzygium rostratum always affected by rot.

Surface
Irrigation of pasture
Filicium decipiens
Tabernaemontana dichotoma

Not Lantana
Mikania scandens
Very common

1956 Ceylon

Pterocarpus petals falling like rain. Cover ground. Odor spicy, like Acacia farnesiana.
(cycle - loses leaves. then produces new leaves and flowers. covers ground with petals. for a couple of weeks. then pistils turn black. Then a rain of green fruit, then one of ripe fruit.)
Trunk fluted, sometimes
Neoldisia casuarifolia
Canthium dicoccum
Lannea grandis -
Elaeocarpus serratus
Pterospermum canescens
Maraspera indica
Ficus hispidus (opp. leaved)
Weedlandia notoniana (in open)
Acronychia laurifolia (understory)
Mallotus (in open)
Garcinia gamboginus (under story)
Caryota urens
(used for palm sugar, toddy, and
Ferns
Blechnum
Angiopteris
Polypodium
Polypoteris?

Endrocalamus giganteus

This forest is an old growth secondary forest, with some trees up to 2 a meter or more dbh. The canopy is irregular and not complete. Many of the principal trees are exotics, especially mahogany. Second story incomplete and irregular. Lower woody layer principally saplings and seedlings of most of the trees, ~~of~~ ~~the~~ especially of Mahogany.
Holmes says that this ~~the~~ species is becoming more and more abundant in the wet evergreen forest and will probably dominate this type all over Ceylon within 50 years.

Artocarpus nobilis is one of the common trees. The leaves of mature trees are entire or very slightly lobed, stiff, crisped. Seedlings up to 1-2 m. have deeply lobed leaves resembling those of Artocarpus altilis.

1956 Ceylon

Mar. 25 — bet Kandy and Kurunagela

Rubber plantations some of which have an under story of Theobroma. Tea plantations in Kandy area are mostly in very poor shape or abandoned - given over to rubber ⊕ or ⊖ general mixed cultivation of coconuts, breadfruit, jak, areca, mango, banana, ceiba, Theobroma,

Xylopia parviflora with white trunks seems almost dominant in evergreen forest lowland type on steep upper slopes of mountains above Kurunagela.

Just above Kurunagela on flat land and extending to Chilaw - Nagombo the major crop is coconut. Still some rubber and rice. Under coconut trees a thin sod of Axonopus compressus. Used for grazing and serves to reduce erosion.

Bamboo a common shade tree

Badagamuwa Forest Reserve on Kurunagela road to Pambulla

Artocarpus integer planted in mixed with many other trees, also Vitex plantations. Lucaena used as nurse crop, but has in many places shaded out the jak trees. Plantations date from late '20s and early '30s

Land taken out of shifting cultivation "chena". Trees up to 3 dm. diam. to 15 m. tall, extremely variable in form. Soil yellowish brown, gritty. Shrub layer very sparse, of Melicura, Xylopia involucrata etc. Semecarpus, Berrya saplings. Ground layer almost absent. Small grasses, seedlings, etc. but ground covered by leaves. Where jak and Vitex planted together, Vitex will suppress jak. Lucaena also outgrows both Vitex and jak.

mahogany seedlings not abundant.

At this season Vitex and Lucaena are both almost leafless, so the thin under growth looks odd, but the rest of the year the canopy is almost complete.

Moist area

1956 Ceylon

In the older stands
-jak, teak (later underplanted
with mahogany, the
lower layer much denser
and not very well differentiated
Here some Chlorocylon swietenia
Semecarpus obscura (local endem
(fair sized tree)
Lasiopetalum has equalled
or overtopped the other trees
even though planted later.
Reproduces well.
Chlorocylon seedlings appear
in dry season, die back to
ground in wet season, repeat
this many times, till an
opening appears, then it
grows rapidly to a large size

Another stand of
mixed indigenous species.
Unsuccessful when
canopy was left intact.
When opened by half
more success. started 1936
Here, with Filicium, Canarium
zeylanicum, Ailanthus
triphysa, Artocarpus
nobilis, Macaranga peltata
Nephelium longana Lophopetalum
The large trees remaining
are 30-40 m. tall, lianes were
cut. planted layer now
10-15 m. and the dense

undergrowth not
sharply distinct from it.

another stand where jak
was planted close together,
not thinned for a long time,
then thinned. The sudden
opening led to drying
back of the remaining trees
and entry of many secondary
trees - Macaranga peltata, a
a small-leafed Ophiomenus
forms a thin ground cover.
The forest now very thin.
Fora collected here.

A stand of planted mixed native
species without any canopy
trees left - is a bit thinner
and lower than the planted
layer in the stand under the
canopy. Trees more
slender and more
sparsely leafy, but
closer together. Sapling
very crowded but stringy.

Chaetasia tabularis - planted
in open is seriously attacked
by Hypsela
in shade not.

This is all in Holmes Dry fores
of Wet evergreen. I would call moist.

1956 Ceylon

Scattered termite nests, conical, 1½ 2 m.

Mesua ferrea will not become established in open. Needs nurse tree.

Artocarpus lapucha small leaved, deciduous native to Ceylon

Growing above in Ceylon by a very small tree, the form imported from Burma is much larger and is being planted here.

In some trees, esp. jak if a branch dies off the wood may be attacked by Eutermes greeni. After this continues the tree ~~~~ shows a heart rot, with lesions in which maggots live. Form large brown streaks in trees.

Canarium zeylanicum is loosing its leaves now. Its seedlings emerge with large buttress

Vitex pinnata needs for first year, then if shade not removed will die out. Naturally come up in gaps. Shade there provided by shrubs. Can grow in open but the is very branched.

Wood of Celtis cinnamomea has very bad odor. When natives are angry with each other, they put a piece of this wood in the well, rendering water undrinkable.

Strychnos nux-vomica occasional - bark very bitter, ~~~~ taste persisting in mouth.

This forest generally has few epiphytes, except thin moss and cortidose lichens. Lianas and creepers adherent to trunks, on other hand, abundant.

1950 Oct 6
Walking bet. Rumbalgamuwa
and Kankanigamuwa

Mr. P.S. Kankanigamuwa
Forest Reserve
Wet evergreen forest
but rather heavily
logged out. Very dense
undergrowth due to felling.
Abundant seedlings
of Lucietenia macrophylla.
On one side of road most
of the trees are mostly Lucita
about 20m. tall. Under-
growth not well differentiated
into layers but very
abundant at all heights.
On other side mixed
native forest but very
degraded. with secondary
species, as Macaranga
peltata, Grewia
etc. growing side-by-side
with Dipterocarpus zeylanicus

A dense patch not
logged recently. trees
to 30-35 m. canopy very
irregular, but heavily
covered by lianas
layering not clear

A naturally regenerated
plot, done 1938-42,
~~now mixed~~ then the
canopy removed.
now mixed secondary
forest with very dense
stand from saplings
1-2 m. to small trees
to 15 m. and 1.5-2 dm. dbh
no distinct layering,
practically no ground
cover, but abundant dead
leaves, esp. Artocarpus
nobilis. The percentage
of economic species increased.
because others were cut out.
Artocarpus nobilis
Schizopheplum rottlerifolium
Vitex pinnata
Chaetocalyx castanocarpus
Dillenia retusa
Mangifera zeylanica

Control plot has
trees to 40 m. & more,
3 strys - incomplete
canopy 30-40 m.
second layer about 20 m.
shrub layer 2-4 m.
This latter rather dense
but one can walk
freely between the
slender saplings.
no ground layer at all.

1956 Ceylon

Rainfall 75-102"

Large trees to 4-5 d.m. d.b.h. Some buttressed.

Base of shrub layer and saplings of canopy trees - suppressed seedlings.

Those of Artocarpus tend to have small entire leaves when suppressed, incised when young.

Artocarpus, Garcinia cryptocarya, Mesphilium Ostodes, Mangifera

Epiphytes rare but Asplenium widely present. Few ~~stipulate~~ climbers in interior of forest. Xylopia championii with long straight clear trunks, bottle-brush crown prominent buttresses.

Soil brown - lateritic gravel and stones.

Large trees (perhaps 20 m. apart where canopy is good.

ground completely protected by layer of leaves, esp. Artocarpus.

March 16-24 - Kandy

among the most conspicuous features of the landscape are large number of crows. These perform the function of scavengers and seem to take the place of the vultures of tropical America. They are very noisy and very aggressive, and abrogate around buildings and habitations, seem very well adapted to a commensal existence with man.

Deraniyagala says that in India the vultures abound in the north and are abruptly replaced southward by crows.

There are two species, a completely black one, commonest at Kandy, and a partially gray one, noticed with the black one at Colombo.

1956 Ceylon

March 25 - Kanbrasiyawulla Forest Reserve, half way between Panadda and Kuliyapitiya

3,6739		Ixora occasional in secondary thicket.	shrub 1.5 m. tall. flowers white. odorless.
1	40	Phyllanthus edge of secondary thicket	shrub 1.5 m. tall, ~~fruits~> staminate flowers pendent, fruits held erect from distichously arranged branches. plant purplish green, flowers white
1	41	Borreria spermacoce assurgens R. + Schult. weed in clearing	

March 25 - Badagamuwa Forest Reserve, 3 miles north of Kurunegala

1	42	Combretum trawifolium edge of forest along road.	liana hanging from tree.
1	43	Tricalysia edge of thicket	sparsely branched shrub 1.5 m. tall, flowers white. fruit blue.
1	44	Ixora thicket	shrub. flowers white.
1	45	Ixora secondary thicket	shrub 1 m. tall, flowers vermillion.
1	46	Ixora secondary thicket	shrub, flowers vermillion.

1956 Ceylon

March 20 Rail trip from Kandy to Colombo.

The lowlands east of Colombo may be described as a catena with areas of very slightly elevated, usually rolling land, lateritic in nature, covered by coconuts, rubber, and general cultivation alternating with low flat marshy areas largely devoted to rice cultivation, though left fallow for a short time. These fallow patches are covered by weeds of various sorts, the aspect depending on how long they have been uncultivated, how wet they are, how intensively they are grazed by water buffalo, etc.

Areas with standing water are likely to be covered by Salvinia, Nymphaea, etc.

Heavily grazed areas tend to be grassy. Other areas have a mixed weedy flora

1956 Ceylon

March 20 - Colombo

307/47 Pisonia grandis
planted in U.S. Embassy grou

48 Pisonia grandis var. alba
planted in U.S. Embassy grou
very common in Colombo.

rounded tree 10 m. tall.
all leaves green; fruiting
fairly freely.
rounded tree 6 m. tall,
leaves on upper parts
whitish green. Leaves
said to be eaten. No
flowers or fruits seen.

1956 Ceylon

Mar. 27 - rail trip from Colombo to Galle

South of Colombo the coast is lined with a belt of coconut plantation the trees growing on beige colored sand flats, with either no ground vegetation or a very thin grass. Where there is a gap in the coconut groves or a wide place in the flat between the coconuts and beach there is usually a lumpy ground cover of bluish green Spinifex grass, and often clumps of Pandanus. This tree may not have exactly the same habit as P. tectorius and the spines on the leaves seem farther apart. There are also low clumps of Clerodendrum inerme(?) and mats of Ipomoea pes-caprae.

Near Paradura there are clumps of Scaevola frutescens and flats of close cropped grass. Scaevola is a noticeable component of the berm vegetation also Calotropis. This is true also inland in the coconut plantation, where also Hibiscus tiliaceus and Cassia occidentalis

foliis(?) become important. The greater the distance inland the more species of trees and shrubs are found, especially around the numerous dwellings.

Just north of Kalutara is a lagoon or estuary with marshes and swamps along its margin that show a considerable diversity of vegetation including Typha.

South of Kalutara the top of the beach is lined with large Calophyllum, Terminalia, and other trees and here the undergrowth in the coconut groves tends to be very luxuriant. The grass here, also, is much greener and richer.

Along estuaries a shrubby growth, in which Aegialitis is evident, with scattered Pandanus, various mangrove species. Clerodendrum, Acrostichum, etc. In low lying coconut land are channels apparently for drainage, also manuring, along which Colocasia, Acrostichum and

1956 Ceylon

are conspicuous.

Southward toward Alutgama - Besides the arborescent vegetation in the coconut groves becomes much more luxuriant. Patches of estuarine swamp and even a few nice patches alternate with much larger areas of coconuts. Houses are scattered thru this area, as in most of the land from Colombo southward. Breadfruit trees are common, also some mangos. Alocasia and Xanthosoma noticed here as well as Colocasia.

South of here the groves are more open and grassy, at least close to the beach. Obviously heavily grazed. Dwarfed Pandanus very common. Here the flat low coastal land is interrupted by low rounded rock masses here and there.

Southward several hundred yards back of beach, are rather extensive rice fields. Crinum sp

becomes an important element, at least locally in the vegetation just back of the beach.

Just before Kosgoda a large estuary, lined with a narrow belt of scrubby swamp forest. South of this, breadfruit and other trees become abundant again in the coconut groves. Cerbera conspicuous with its white flowers. Mangos common. Some openings - either in garden cultivation or filled with bracken and low thickets, or marshy.

Standing water common in coconut groves. Large expanses of Acrostichum marsh and thin scrubby mangrove swamp.

Occasional knolls to 4-6 m. high of deeply weathered, apparently lateritic material.

Area around Ambalangoda some distance back from beach very luxuriant in appearance. Much taro in wet spots, also Alocasia.

South of here, just

1954 Ceylon

beach of beach, limestone
or marl is being dug up and
burned in kilns. Irregular
ponds result.
Then an extensive area
of scrubby swamps.
near Kalutara South of this, low
ground back of beach-
ridge, among houses
in arcuate groves are
irregular pits, full
of water - possibly
retting pits. Salvinia
locally abundant in
these.
Nypa fruticans is abundant
locally.
Southward the ground
between the coconut trees
seems to be systematically
excavated according to a
rectangular pattern of
either narrow or broad
ditches. These either filled
with water or decomposing
vegetable matter.
Near Kitalagama and
luxuriant taro patches
in low places in coconut
groves.
Southward more marl
pits for lime.
Agave americana has
been seen locally at a

number of places all
the way down.
Goats and cattle are
common but not
abundant. The grasses
grazed to a thin sod
in many places.
Taro even more common
southward to Vita.
Before Vitex
becomes abundant in
vegetation at top of
beach, apparently the
unifoliolate form of
V. trifolia. Pandanus
and Thespesia conspicuous,
forming small thickets.
Calotropis also abundant.
Well back of beach,
breadfruit, Albizzia, and
taro abundant in coconut
grove. Some mangrove
along estuary north of
Gintota, but very few species.
Then some knolls of
laterite, locally rather
extensive, esp. around
Richmond Hill and southward.
Covered by coconuts, mango,
breadfruit, etc.
living fences of Hibiscus
tiliaceus and glricidia
sepium north of Galle.

1956 Ceylon

March 28 - Kottawa
Arboretum of Ceylon Forest Service
A 15 acre patch of relatively undisturbed rain forest. The large trees are labelled and phenological records have been kept since 1937.
The area is irregularly hilly, with small ravines and rivulets.

The canopy seems quite irregular, not complete. A layer of small pole trees and shrubs 1-10 m. is fairly general, called "shrub layer"
Top layer averages 125' ht. has fewer species than the lower layer. Has relatively few epiphytes but certain individual trees seem to have a fair abundance of them - Drynaria, orchids etc on trunks. Mosses and lichens on trunks fairly general. Epiphytes on branches are not at all conspicuous.

Canopy seems to be about 60% but open in

covered areas is thin.
This season has been unusually dry and flowering trees been unusually heavy many species which have not flowered for years are now in flower.

On ridge tops the "shrub layer" is thinner the individual trees smaller than on lower slopes. Average here is 1-2 dbm. diameter, though some individuals much larger.

Lianas not conspicuous

Randia gardneri is a medium sized tree, common on ridges.

Ground disturbed by wild pigs. Monkeys seen in trees.

Gleichenia is in opening from landslide or fire

1954 Ceylon

boil on ridge top -
a layer about 3 dm. of
yellow-brown mixture
of clay and sand, becoming
slightly more gritty and
with small iron gravel
downward. At 3-4 dm. is a
compact but not consolidated
reddish-yellow layer.
This layer has harder
and larger concretions,
nut-size, and sticking clo
Downward this becomes
quite gravelly with
the red-brown concretions.
When cleared this type
is said to form a hard
crust very rapidly.
Depth of soil 3 m. or more,
changing gradually
to bedrock.

Rooting of trees in this
soil relatively shallow
about 1 m. or so, from
observations by foresters
on windfalls, cuts, etc.

No darkened surface
layer at all. a layer
of loose leaves and litter
several cm. deep but
transition very abrupt fro
intact leaves to none at all.
The partially decomposed layer
is no less than 1 cm.

On ridge tops walking
is scarcely impeded
by the relatively thin
layer of saplings.
Small colony noted
of a dwarf pandanus
with stems not more
than 1 m. high but leaves
to 3 m. (or even 4) long.

In ravines the under
layer is much thicker
and of larger saplings.
The scattered big trees are
bigger. Ferns are
common, with a slender
tree fern with slightly
prickly stipes is conspicuous
Pectaria and several
other genera noted.
Lelegs occasional
Some Marantaceae on trees
or flat places along stream.
Climbers more common
here, incl. Freycinetia.
Corticolous mosses and
lichens more developed.
Ground layer on slopes
present but very sparse
and discontinuous.
Spacing of big trees
irregular 2 - 20 m.
Canopy almost complete.
Second story sparse and irregular.

1956 Ceylon

Soil on 35% slope 2 m. above stream on ravine - sometimes submerged during heavy rain. Surface litter of dried leaves 2-10 cm. but most leaves fairly intact - few in advanced stages. No darkened layer. about 15 cm. of silty sand yellow gray-brown, friable even when moist.

Then 20 cm. a mass of yellow brown very plastic clay with some coarse quartz grit and much biotite in irregularly scattered fairly large pieces.

Below about 3 dm the color becomes lighter and a mottling due to increasing inclusion of biotite and (probably) pseudomorphs of to 1-2 a more cm. of an incompletely weathered very light feldspar giving a pale yellow clay. The yellow-brown clay matrix is very plastic. A very few soft dark red brown iron concretions, esp. in top layer, but not conspicuous.

The layer of dead leaves on the ground is infested with leeches in great numbers. These are reddish to gray or black, and when extended may be as much as two inches long. They crawl up on one's boots and will attach themselves even through a heavy woolen sock, starting to suck blood almost immediately. When pulled off, even before well attached, blood will run from the wound. If left till distended they detach themselves.

1956 Ceylon

List of trees in Kottawa Arboretum from Forest Dept. records - list submitted by Rosayro.

Artocarpus nobilis Thw.
Fasianthera apicalis Thw. (Olac.)
Myristica dactyloides Gaertn.
Aniosphyllaea zeylanica (Rhiz.)
Chaetocarpus castanocarpus Thw. (Euph.)
Dipterocarpus hispidus Thw.
Mangifera zeylanica Hook.
Campnosperma zeylanica Thw.
Doona ovalifolia Thw. (Dipt.)
Dipterocarpus zeylanicus Thw.
Kurrimia zeylanica Arn. (Celast.)
Dillenia retusa Thunb.
~~Myrsine~~ Horsfieldia iryaa
Chrysophyllum roxburghii G. Don.
Worinia triquetra Rottb.
Palaquium rubiginosum Engl.
Hydnocarpus octandra Thw.
Palaquium petiolare Engl.
Mesua thwaitesii Pl. + Tr. (Gutt.)
Lyniplocos cuneata Thw.
Calophyllum spectabile Willd.
Vitex pinnata W. (V. altissima W.F.)
Agrostistachys borneensis Thw. (Euph.)
Mastixia thwaitesii (Corn.)
Garcinia ternophylla Thw.
and var. acuminata
Isonandra lanceolata Thw. (Sap.)
Timonius jambosella Thw.
Memecylon zeylanicum (Mel.)
"Kirilaraliya" (Dipt.) unident.
Palaquium parvifolium

Symplocos cornata Thw.
Eugenia grandis
Kokoona zeylanica Thw. (Celast.)
Acronychia laurifolia (Rut.)
Syzygium walla Gaertn. (Thym.)
Elaeocarpus subvillosus Arn.
Byrsophyllum ellipticum (Rub.)
Eugenia sylvestris Moon.
Cryptocarya wightiana Thw.
Canarium zeylanicum Bl.
Myristicinya Gaertn. (= Horsfieldia i. ?)
Calophyllum bracteatum Thw.
Polyalthia acuminata Thw.
Semecarpus subpeltata Thw.
Garcinia echinocarpa Thw.
Semecarpus parvifolia Thw.
Lunaptea scabriuscula Trim. (Dill.)
Carallia calycina Benth.
Actinodaphne stenophylla Thw.
Litsea gardneri Thw.
Dipterocarpus glandulosus Thw.
Carallia integerrima DC. (Rhiz.)
Macaranga digyna Muell.
"kudu wana Idala" unident. Rub.
"Kaha badulla" unident.
Randia gardneri
Garcinia cambogia Desr.
Agrostistachys borneensis Benth. (Euph.)
Bridelia retusa Spr. (Euph.)
Canthium didymum Gaertn. (C. dicoccum Merr.)
Xylopia championii Hook f. & T. (Anon.)

Phenological observations being kept up by local officers.

1956 Ceylon

~~Kott~~ March 28 - Kottawa arboretum, near Galle

7674	9	Osbeckia edge of rain forest	shrub 2 m. tall, sparsely branched flowers rose-pink
1	50	Melastoma cleared roadside, edge of rain forest	erect shrub 2 m. tall; flowers rose pink.
1	51	Artocarpus nobilis Thw. common in rain-forest	large tree, dry leaves picked up from ground
1	52	Dipterocarpus zeylanicus Thw. common in rain-forest	enormous tree, dry leaves picked up from ground
1	53	Dipterocarpus hispidus Thw. ~~rare~~ common in rain forest	enormous tree, dry leaves picked up from ground.
1	54	Warmia triquetra Ratth. occasional in rain-forest	leaf from ground and are secured by natives from shoot of large tree.
1	55	Ardisia: rare on ravine side in rain forest	leaves dark green, above purplish beneath, thick; inflorescence and flowers bright pinks.
1	56	Tiemonius: rare in rainforest	small much branched tree, buds white.
2	57	Flacheria linearis (Burm.f) C.B.Cl. common in openings in rain forest on steep slopes	forming dense tangles
1	58	rub rare in undergrowth in rain forest	shrub 1.5 m. tall; fruit black, fleshy. "walkofi"
2	59	rub Hedyotis inamoena Thw. occasional in undergrowth in rain forest	shrub 1 m. tall, leaves pale beneath, flowers white. "kaluwaraniga"
2	60	rub rare in undergrowth in rain forest.	shrub 2 m. tall; inflorescence pale green, in bud only.
2	61	Hedyotis Fruticosa L. common in weedy land on slopes.	erect shrub ~~3~~ m. tall; flowers white.

1950 Ceylon

March 28 - Coast between Galle and Hikkaduwa - The coastal plain is only a couple of feet above sea level. There has been extensive work done to lessen erosion by the sea, in the form of lining the beach with large boulders of metamorphic rock

3-762 Cerbera Pagiantha dichotoma (Pl. O. Nicobars) (Roxb.) Markgraf
on sandy area back of beach

3 63 Vitex trifolia
common on sandy area behind the beach

4 64 Scaevola sericea
common on sea-wall of boulders.

about 2.5 m. tall. cauliflora. flowers white with yellow eye, buds yellow. fruit orange and fleshy with two lateral ~~lobes~~ angles when ripe. pendent. spreading shrub, horizontal stems with terminal secondary branches; ~~leaves~~ small tree 3 m. tall; flowers lavender fruit white (note stack of silky axillary hairs).

1956 Ceylon

May 27 - Hikkaduwa
11 mi n. of Galle
sand flat with Ipomea pes-caprae fringe at top of beach, with Emilia in the mat of Ipomea. Back from the beach are low tangles of Clerodendrum inerme. Here it has very fleshy leaves. Good flowering specimens were not seen.

36765 Pandanus proctrusus St John Holotype
very common along top of beach.

to Clerodendrum

1 66 Clerodendrum inerme (L.) Gaertn.
Locally common back of beach

+ 67 Ipomea pes-caprae (L.)
common at top of beach of quarty sand.

+ 68 Emilia sonchifolia
common in mats of Ipomea pes-caprae at top of beach.

Pandanus along shore is a small, densely branched slender species with spines longer and more remote than in P. tectorius. The stems are clothed with dried remains of leaf bases. The color of the leaves is bluish green. The heads are small, more or less globose, with the phalanges more or less truncate apically.

slender stemmed densely leafy tree 5 m. tall, fruit head round, small, becoming orange, not eaten. Branches clothed in old leaf bases, forming coral tangles; leaves fleshy.

forming thin mats not over 3-5 cm. deep; leaves somewhat leathery, with an angle between blade and petiole; flowers deep rose-purple, closed at 4:30 p. m. when collected.

depressed fleshy glaucous plants; flowers pinkish lavender, slightly exceeding involucre. (seed sample & duplicate voucher for J. T. Baldwin) for chromosome count

1956 Ceylon

March 30 – Nuwara Eliya.

The town is in a rolling flattish valley, surrounded by mountains. The forest has been cleared and replaced by grass and groves of exotic trees – Cupressus, Eucalyptus, Acacia, etc., even Cryptomeria. Some of the Cupressus are immense. The cones are too small for C. macrocarpa. The habit is spreading and when old the trunks are fluted irregularly.

Waste spots are irregularly covered by Ulex, with scattered Rhododendrons with heavy woody trunks, gnarled and seeming by out of proportion to the size – about 5 m. tall. The capsules are 10 loculed, dehiscing loculicidally 5 sutures first, then the valves splitting, making 10.

The Acacias are probably A. dealbata and A. melanoxylon. The former is flowering some.

It has been abnormally dry here since October. The last rain was about two weeks ago, when a little bit fell in the evening. Things are in poor condition and water is scarce.

The slopes east of the town are partly covered by tea plantations, part by a mixed scrub. Whether the scrub is a result of fire or of cutting of firewood is not clear but probably the latter. Acacia seems to be cut out of it as soon as it reaches any size.

The scrub averages about 2 m high, somewhat less at the bottom and more toward the top of the hill. Quite a few plants are represented – Berberis, Osbeckia (red-fld), and Pteridium esculentum are found especially lower down.

Rubus. Tabernaemontana (?), several shrubby Compositae, a prickly ~~entacanth~~ shrub and a sterile bifid shrub with opposite leaves and still roots seem to be rather general. Ufward Eupa, Rhododendron, Rhodomyrtus and a number of other shrubs such as several Melastomaceae and a Cinnamomum-like climbing Bamboo become more prominent upward, also Gutiferae with wiry habit.

Scattered on the upper slopes are emergent small trees.

1956 Ceylon

3-4 m. tall, gnarled and twisted, mostly Rhododendron, not in flower now, but mostly with almost mature fruit.

On the ridge top the scrub gets taller, 3 m. & more tall. Here it is in some places almost entirely made up of the bisfid leafed shrub mentioned on the slopes. Here this forms dense brakes of long straight stems an inch or less thick. Other shrubs locally mixed with it. It has the behavior of a plant that follows fire in its zone even stands but no evidence of fire. With things as dry as at present fire would be a definite possibility, but this is unusual. There are not many ferns, though, and few epiphytes, a creeper.

This scrub as well as that on the slopes is so dense as to be impractical to walk through without a machete.

Scattered in the ridge scrub are the small patches of small trees with the habit of Metrosideros - one species actually looks like Metrosideros but is sterile at this season. A number

of genera are represented. These trees are from 4 to 8 m. tall. On parts of the ridge these trees are not in patches but scattered as emergents in the scrub. Here there is a bed of the climbing bamboo, small patches generally scattered in the ridge-top scrub.

Wild pigs have been digging in various places the soil is rather yellow-brown, clay.

Where the ridge has a broad flat top there is a tea plantation with no shade. On the south part of the ridge all except the cliffs are covered by tea plantations, partly unshaded partly with sparsely scattered Grevillea robusta trees.

The soil in the tea plantations is kept very loose by forking. It is almost yellow ochre colored on the top and steep slopes, becoming slightly more reddish on the gentle slopes below. Very fine and clay like both places.

Pteridium aquilinum seems to be a bad weed in the plantations, at least quantities of rhizomes have been dug out.

1956 Ceylon

Mar. 30 – ridge west of Nuwara Eliya, center of island, scrub and patches of scrub forest on ridge top

3 67 69 ~~Undetermined~~ clear bottom of very local, dessiccated small frond

3 70 Psychotria
common in patches of scrub forest

1 71 Metrosideros?
common in patches of scrub forest

1 72
dominant in tall scrub

2 73 Pittosporum
occasional in patches of scrub forest

1 74 Hedyotis corymbiflora (Thw.) Alston
occasional in edge of scrub.

Mar. 30 Upper Nanu Oya river just below Nuwara Eliya, center of island.
montane rain forest, rather degraded;

2 75
2 76
2 77
2 78
2 79
2 80
2 81
2 82
2 83

7100 m.

Scirpus fluitans L. det. S. Koyama, 1975

granled tree 8 m. tall; stipular thorns of Acrocarpus; flowers greenish, tube very short.

tree with rounded bunchy tips to limbs; sterile.

erect shrub with stilt roots; leaves tending to be pinnate when young, without pronounced odor; sterile.

tree 6 m. tall; fruit immature.

erect shrub 1.5 m. tall; leaves deeply sulcate.

on great boulders of metamorphic rock along stream.

epiphytic on trees in montane rain forest, rather degraded

1956 Ceylon

App.

36784		Aphanomeris tenuifolia? on vertical road cuts in hard clay
1	35	Lycopodium on overhanging rock just above stream
1	36	Psychotria rare in edge of second growth
2	37	Hedyotis Trimenii Deb & Dutta in roadside brush
1	39	weedy roadside

The Nanu Oya ravine and the mountain slopes above it are covered by a mixed montane rain forest with many species represented (mostly unidentified even to genus). Weinmannia and Eurya (at least 2 species) were noted.

The stature is low, 5 m., on exposed ridges, 10 m. on open slopes, and up to 20 m. in ravines.

Mosses and vascular epiphytes, as well as parasitic Loranthaceae, are common on trunks and main branches of many of the trees, but not so on smaller branches or leaves except in ravine

tufts; fronds drooping at tips

pendent.

shrub 1 m. tall, flowers white

erect shrub 1.5 m. tall, leaves smooth.

small shrub 0.3 m. tall, flowers white.

bottoms. They are not nearly abundant enough to make this a cloud forest or elfin wood.

Ferns are common on ground, becoming much more so toward the ravine bottom. Where examined they in a tangle of weedy shrubs as undergrowth, probably largely resulting from disturbance: some climbing bamboo and a very large Amomum (?) with a bright red inflorescence

It is so dry that the mosses and most of the ferns are curled up.

There are few real climbers,

1956 Ceylon

except in the ravines, but an abundance of scramblers such as Elaeagnus, and especially the bicuate-leafed shrub mentioned above (3.772). Of this latter there may possibly be 2 species, an erect one and a scrambler.

Roadsides and other recently bare places are covered by a blue-flowered iridaceous plant and a small Eupatorium, several grasses, incl. Chrysopogon, ~~and~~ Eriogon parviraharyanum, Pteridium etc. The steep cuts are being colonized by several grasses, Sphenomeris, and by Lycopodium cernuum. Here definitely seem to be sprouting of this plant unless there are gemmae. There has never been any volcanism as far as known.

On talus below roads, brushy roadsides, etc. in the area of tea plantations have a low brush of Rubus, Cestrum, Ulex, Solanum, ~~Cestr~~ Hypericum (a tall shrub with large flowers when sterile it looks like Veronica (Hebe)), and a shrubby Lobelia.

March 31 - east side of Nuwara Eliya valley.

On sloping ridges ~~and~~ extending from the foot of the mountains, where they are neither cultivated, in orchards, or eroded bare, there is a scrub more or less similar to that on the west side.

It is dense and tangled, about 1 m. high at lower edge, increasing to 2-3 m. upwards, and in places even perhaps 4 m. The presence of several prickly scramblers (Toddalia, Rubus etc.) makes pushing through it most difficult and unpleasant. It is composed of: climbing bamboo, Melastoma, Rhodomyrtus, Berberis, Hedyotis (3 spp.), Rubus, Lobelia, Toddalia aculeata, Pittosporum, several woody Compositae, Gardenia (? sterile), Pteridium, Morinda, Myrsine ?, Eurya, Tabernaemontana ?, the same bicuate leafed shrub seen yesterday and several other unfamiliar shrubs.

1956 Ceylon

On the steeper slope of the mountain, up from the tops of the ridges described is a woodland which seems to be a much degraded montane rainforest. It has scattered trees of ~~a number~~ species 10–12 m. high, mainly with a sheltered crown habit, spaced from 10 to 50 m. apart, closer and closer together upward to about 150 m. above the valley floor where it closes into a montane rainforest quite degraded and with dense tangled undergrowth 3–4 m. high.

In the woodland part the ground is covered by

March 31 – slopes east of Nuwara Eliya
in tangled scrub.

36789 Hedyotis?
very common, even in almost bare places

1 90 Toddalia aculeata
common

2 91 Morinda
occasional

a dense low scrub 1–2 m. tall with some of the plants from the scrub below rising above, dominantly a very aromatic dioecious leafed hirsute plant now sterile, with the slender Hedyotis (?) common, as well as the sterile hirsute plant seen yesterday, and young trees of a Lythraceae (Nesaea??).

Small paths wind through this scrub and lose themselves. In all probability the present vegetation is the result of severe cutting for firewood in a montane rainforest accompanied by persistent grazing, the cattle not taking the aromatic plant.

1960 m.

erect slender shrub 1 m. tall (others seen to 7 m. in taller vegetation); flowers white.

erect to scrambling or scandent shrub, aromatic when bruised, shrub 1 m. tall; fruit immature.

1956 Ceylon

March 31 - road from Nuwara Eliya to Hakgala Botanical garden, down Hakgala Ganga (stream).

Upper part of stream valley flat, mostly in truck gardens. In places the stream is dammed up for fishing, planted with trout by Ceylon Fishing Club.

Just below Nuwara Eliya Eucalyptus and even some Casuarina equestifolia (?) are planted, along with Cupressus. Tea plantations in this section are irregularly cut into patches by hedges for protection against wind, etc. Guide says this is only done by one company. No shade trees in these plantations. Many of the plantations have been severely hit by frost (1½ months ago) are guide and some are pruned back almost to the ground.

Down a short distance the tea plantations are replaced by bushy forest on the slope and some grass on lower slopes, or all forest.

At about mile post 52,

a little over half-way to Hakgala, the pattern of grassland on lower slopes, montane rain-forest on upper slopes and in ravines is rather definite. The forest is mixed and of low stature. The grass is mainly tufted (Cymbopogon?) and has scattered gnarled Rhododendron trees in places.

Near mile post 54 the grass and forest was examined. The slope is about 30°. The lower 100-150 m. is grassland badly overgrazed, with a blue-flowered iridaceous plant locally dominant, bunchy Cymbopogon locally prominent, and a close sod of several creeping grasses filling the interstices. The forest has probably been gradually pushed back, as a narrow strip along its margin has recently been felled. The soil changes gradually from black just above the stream ravine to brown at the edge of the forest. A typical profile was

1956 Ceylon

exposed where the underlying schist bedrock was being quarried for road material. This was just above the edge of the ravine. Profile as follows

0-10" black sandy loam, gradually changing to
10-20" yellowish brown clay with some rock fragments, abruptly changing to
20"-4-6' mottled irregularly reddish clay with rock fragments, directly on hard bedrock. The rock weathers only an inch or two, then hard and dark gray.

The surface layer varies from gray to black and also in thickness. It would be of interest to know if this black layer has been formed as recently as its occurrence near a receding forest margin suggests.

The ravine at bottom, where not excavated, is filled with a ragged wood. Partly native trees, partly Acacia dealbata. A little Gleichenia linearis here, a few tree ferns.

The forest above the grassland is of low stature, 5-8 m., the trees gnarled, with metrosideros habit, small leafed, dark in color, green to reddish green.

Principal trees are Leptospermum, Metrosideros(?), Eurya, and Neolitsea(?). Vascular epiphytes common on trunks and larger branches, mosses and lichens fairly abundant and even to small twigs in crowns, not enough however to make it a true cloud forest or moss forest.

Climbers and scramblers are common, though mostly in more disturbed parts, mostly prickly, such as Rubus (one sp.), Toddalia, etc. Some climbing bamboo of a startlingly chinequoid appearance.

In less disturbed spots undergrowth is mostly of tree seedlings, though not easily enough penetrated even without a machete. On the ground are ferns and Selaginella.

It is mostly much more disturbed probably by cutting for firewood and

1956 Ceylon

certainly by grazing.
Here is a much thicker undergrowth, with large saplings of the dominant trees tangled with climbing bamboo, ~~Hedyotis (2 spp.)~~, Rhus, Rubus (2 spp.), Toddalia, etc.
The openings are choked with a tangle of Hedyotis (2 spp.), climbing bamboo and Rubus (2 spp.) as well as some Leychotria saplings.
Penetration here is very uncomfortable without much cutting.
In the forest was seen an Arisaema with a inflorescence very like the zebrina form of A. atrorubens, but with a digitate leaf with 3 leaflets.

March 31 - Hakgala Gangs, about 1 mile above Hakgala.

36792 Hedyotis Trimenii D.& B. & Dutt.
in tangled opening in degraded montane rain-forest.

The bamboo has hollow stems and climbs to 3-4 m. in dense vegetation. Looks for all the world like Chusquea.

On some grassy slopes not far from here are sparse plantings of Eucalyptus

Hakgala Gardens are beautiful, have a wealth of species of plants, but show definite signs of neglect. 5581 ft. alt. 53 acres.

Mean annual rainfall	94.85"
Mean temperature	60.5°F
Lowest "	38.8°F
Highest "	82.2°F

1800 m.

shrub 1.5 m. tall, erect.

1956 Ceylon

March 31 — trip to Moon Plains, Bulunwala gorge, and Hawa Eliya. from Nuwara Eliya

Grassland around Nuwara Eliya has scattered small trees of Rhododendron, in places almost forming a woodland. The Rhododendron extend along the road everywhere where the road is not through forest.

Eucalyptus and Cupressus are abundantly planted.

Tea plantations, mostly with hedges common along upper part of road. Then hill, some grassy, then scrub-covered, at this with taller pure montane rain-forest. Others covered by planted Eucalyptus and Cupressus.

The Moon Plains are a rolling grassland with scattered Rhododendron, heavily grazed.

Rhododendron woodland near here immediately along road, 3-4 m. tall, only a strip along road. The origin of this is obscure — either the trees were left when all else was cleared, or they have grown up relatively rapidly

afterward, which seems unlikely. But in the forest Rhododendron is not obvious, though there was no time for a close examination.

The gorge of the Bulunwala stream has part of its walls covered with dense montane rain-forest apparently in fair condition. The slopes are very steep. However, part of them are in grassland.

Toward Hawa Eliya the forest becomes very degraded, with scanty Rhododendron near road, patches of tangled scrub with much Hypericum mysorense, some tea plantation. Much Acacia dealbata and Cupressus planted near and around Hawa Eliya, ~~where~~ even a few pines of at least 2 species. Here also some marshes in the flat valley bottom and some gardens.

1956 Ceylon

April 1 - Trip by rail from Nuwara Eliya to Colombo.

The upper part of the canyon of the Nanu Oya river is almost entirely densely wooded. The lower part to Nanu Oya (5137 ft.) is all covered by tea plantations. This continues downward except on the steepest slopes. No consistent pattern in planting but more seem to have the rows running straight up and down the slopes than not. Scattered shade trees, mostly Grevillea and Erythrina. In the vicinity of Watagoda most of the trees are cropped back rather drastically - possibly as a measure against the leaf blister disease. The general spacing of the trees is so open that the shade is moderate, indeed. The distance varies, but mid at average 20-~~25~~ m. Albizzia is used in some plantations, especially lower down. Below Watagoda and especially near Talakawela, small, closely pruned trees of Erythrina

are planted a few yards apart between the large shade trees. This seems rather regular and can scarcely be for shade purposes, may be for green manure. Each tree has only two or three or at most a few leafy branches left on it, though ~~at~~ on some plantations below Talakawela they have been allowed to grow more and have a turkey duster shape. Here also Gliricidia ~~seems~~ is almost as common as Erythrina in this second layer. This layer is pruned to 2-3 m.

Near Hatton are some Eucalyptus plantings. Shade trees, mostly Grevillea, closer together, perhaps 10 m apart. From here down, the small intermediate trees more uncommon here. Some plantations well below Hatton with no shade at all.

Fourcroya

Fourcroya locally common from here down

Grassland, with Imperata and some Thaneda - more and

1956 Ceylon

~~rare~~ common ~~do~~ down-wards some patches of forest and Eucalyptus plantations. Shifting cultivation rather common. Patches of thicket and of a large Rottboellia (similar to that found on Guam in 1954). Ravines filled with thickets.

~~Talbots~~ Talbots station

Near foot of steeper part of mountains the greater part of the land is in "chena" or shifting cultivation. Coconuts ~~upped~~ upped. On Nanalafitiya finer fairly extensive rice paddies, also rubber plantations. Much grassland. Few tea plantations here. General pattern is a majority of the hill land open, small patches of wood. Of valley bottoms and lower hills practically all are in rubber, coconuts or tea. Some areas terraced for rice. Breadfruit and mango trees common, also bananas, Areca, Caryota, jak. As valleys get wider the rice area increases. All in stubble. Shrubby Lobelia occasional in waste spots. Soil eroded in many places.

1897' alt.

Tea plantations seen in very poor condition. Especially much erosion around Pallegama. Shade trees (Grevillea) in tea plantations seen in rather poor shape.

Around Ulapane the tea plantations are apparently abandoned, bare red soil with sparse tiny bushes, scattered shade trees, general tone of land reddish except valley bottoms, which are in rice and miscellaneous tree cultivation. Rice conspicuously terraced, terraces mud-walled and well constructed. Below here much of the tea is in better condition. More heavily shaded than higher up. Shade trees 5-10 m. apart, mostly Grevillea, with second layer between of Glirisidia and Erythrina. Areca more and more abundant. Rubber plantations more and more common. Some Cacao. Steeper hills mostly in grass with patches of woods. A few

1956 Ceylon

tea plantation on steep slopes, rows running straight up and down.

Near Gampola the valley become broad and flat-bottomed with rice fields. Hills steep. At Gampola station the flood level Aug. 15, 1947 is marked, about 5 m. above ground.

Villages and dwellings almost completely concealed by mixed planting of Coconut, jak, ceiba Mango, Areca, breadfruit, and other trees, with an understory of bananas, guavas, etc. Some bamboo. This is upper valley of the Mahaweli River.

One rubber plantation seen with understory of tea.

Hills here very low, but still abruptly rising from flat paddy land.

Clumps of sugar cane seen, but no sugar plantations seen anywhere in island.

Many carabas working in rice fields.

Below Peradeniya the slopes are largely covered by mixed tree cultivation,

with coconut, Rubber, jak, breadfruit, bananas, Carpota, Areca, Kapok, mango, bamboo, and with cacao under some of the rubber trees. Very little tea below Peradeniya. Some slopes terraced. Valley bottoms where flat, in rice.

First Calvinia seen at Mirigama.

1950 India

April 4 - Kanheri ~~Caves~~, National Park, 10 mi. N. of Bombay
thorn woodland on rolling stony ground

36793 Calliptera floribunda — semi-scandent shrub
very common

94 Canthium — small shrub
common

95 Adina cordifolia — small tree, deciduous
common

96 Holarrhena — shrub - small tree,
occasional — lactiferous; flowers white, fragrant.

97 Coldenia procumbens — very prostrate, blue
local in open dry water-course

98 Mollugo — prostrate
local in open dry water-course

99 (Atylosia) Cantharospermum scarabaeoides — flowers yellowish.
rare

36800 Carissa carandas — ~~shrub~~ shrub, apparently
occasional — not deciduous; flowers white.

01 Morinda tomentosa — shrub or small tree,
~~rare~~ occasional — flowers white.

02 Dervis scandens — woody climbing tree,
occasional — sterile.

03 ~~Dendrocalamus~~ Bambusa arundinacea Retz. Dendrocalamus strictus — Culms clumped, up to 30 cm. apart, green, dull, erect, to 10-15 (or 20?) m. tall, branches distichous and emerging conspicuously at right angles, lower branches solid, elongate, 0.5 m. long, spiny, forming formidable tangles. Leaves deciduous

1956 India

April 4 - Kenhari Caves,
Kenhari National Park, [illegible] 500'
Dry deciduous forest,
rather open.

3670 Capparis
03 Vangueria spinosa ?
occasional — shrub

04 Grewia tiliaefolia
occasional — small tree, flowers green, petals reflexed, stigma fleshy, more or less horizontal.

05 ~~Dichapetes obtusum~~ Caesalpinia ~~Caesalpinia~~ ~~mentosa~~ ? tormentosa
occasional — small tree, flowers yellow.

06 [illegible]

07 [illegible]

08 Aphelanthera
rare on ledges — erect, stiff branches.

09 Capparis sepiaria
rare — semi-scandent shrub, clambering or small tree.

10 Vitex negundo
occasional — slender small tree

11 Solanum
occasional near shore — shrub, fruit orange

12 Holoptelea
occasional — tree.

13 — prostrate

14 Randia dumetorum — small shrub

15 Crataeva religiosa
rare — shrub, deciduous, flowers yellowish.

16 Gardenia
occasional — small tree, fruits yellow.

April 4 - Juhu Beach, Bombay

17 Pandanus
top of beach, gravelly sand — small tree

1956 India

April 5 - Bombay

Clerodendrum inerme is used as an ornamental, being trimmed into hedges. Its leaves are uniformly obtuse or rounded at apex. The flowers seem a bit smaller and more slender than those of the Pacific form.

36818 Saraca indica
planted

Crows are common here, but not as common as in Ceylon. They are, however, accompanied here by vultures and "hawks" (probably another vulture with a long rather square-cut hawk like tail, black in color). These may be seen commonly soaring around the city,

There are rather extensive mud flats occupied largely by mangroves of one species only, Avicennia alba(?), which is uniformly very small, less than 1 m. tall, but growing quite densely. They are said to be so small because of grazing and cutting for firewood.

Some areas of the mud flats are quite bare, largely covered by a whitish salt (?) crust, while smaller areas, intermixed with bare places, are covered by a grass (Distichlis?) and other herbs, only about 1-2 dm. tall.

Tree flowers orange.

and are especially abundant around the "Tower of Silence" of the Parsees, where they devour the flesh of the Parsee dead, placed there for this type of disposal.

1956 India

April 4 - Juhu Beach, near Bombay

This beach consists of a broad bank a very low, almost flat ridge of fine sand and silt, caked and firm underfoot. This ridge is almost entirely covered by coconut plantation except for streets and houses. In front this is a body of ~~salt~~ shallow water. The outer shore is a very broad flat beach, cut into the ridge to form an abrupt escarpment about 2 m. high. The beach is of fine quartz sand with some admixture of larger particles of shell.

Ipomoea pes-caprae is common here and appears to be the same as that seen at Hikkaduwa, Ceylon, except for a greater tendency to form ascending branches, these 20-30 cm. tall, very loose.

What is called Pandanus odoratissimus occurs, scattered along the escarpment at top of the beach. It is a small tree a bit more slender than Pandanus Tectorius; leaves with

spines 1-2 cm apart, their bases broad, the spine divergent at about 30° from margin of leaves. The fruiting head is small, only about 10 cm. diam., spherical, the keys quite flat on top, and with more stigmas than common in P. tectorius. This tree looks very much like the one collected in Ceylon except that there is no tendency for the leaf bases to persist on the branches and the keys have more stigmas, also the fruiting head is smaller.

1956 ~~Ceylon~~ India

April 4 – Kanheri National Park, north of Bombay.

The lower part of this area is flat and covered by mango orchards with some parts rather poorly landscaped and planted to ornamentals. It is said (by Prof. J. R. Banerjee) that a horticulturist was appointed director of the park and that he had the idea of landscaping it and making it a place for people to have picnics on Sunday afternoons. He got into financial troubles and was let out. Now the government "milk colony", a government run dairy, is using the park as a pasture. The lower part is really sorry looking. Borassus palms are very common scattered over the flat low country. Many of them are covered in their lower part by strangling figs, Ficus benghalensis and Ficus glabra (?). These form a rigid cage of aerial roots around the

trunk but do not seem, in most cases, to hurt the palm any. The ones seen did not generally extend more than half way up the trunks.

Inland the dwellings and orchards disappear and the ground begins to rise gradually, to be rolling and slightly cut by dry stony watercourses. The ground is very stony, with boulders scattered over it. Argemone mexicana grows scattered in the watercourses. The rest of the country is covered by a low scrubby thorn woodland, open enough so that walking on an irregular course is not impeded. The ground is baked and dry, the grass and many of the herbs completely ~~dry~~ dry and in most places burned off. The fires are set by the people to improve grazing. Several herbs, especially Blumea eriantha, Celosia procumbens and a tomentose Wedelia are in living condition. The two latter are

= Sorghum + Andropogon (Hemarthria) ?

closely prostrate and bluish-gray in color. The woody vegetation is a deciduous mixture of clumps of bamboo, small trees, shrubs, and woody vine. Most of the shrubs, the bamboo, and some of the trees and vines are spiny or prickly. The bamboo, which is the tallest plant, forms clumps of ascending reading culms, 10-15 (-20) m. long, green, with internodes 20-25 cm. long, 7-9 cm. thick. The branches are distichously arranged and emerge at right-angles from the stem (divaricate). Culm sheaths and leaf blade are deciduous, have been shed at this season. New leaves are just appearing. The lower branches are elongate, to as much as 5 m. viciously spiny, and form terrific tangles about the bases of the clumps. The culms are from very close to as much as 30 cm. apart in the clumps.

Trees here are mainly Adina cordifolia, Bassia flabelifer, Diospyros ebenum, Cassia fistula (completely deciduous), Grewia tiliaefolia, Pongamia glabra, Zizyphus jujuba, Morinda tinctoria etc. Shrubs are Callicopteris floribunda, Holarrhaena, Lantana camara, Randia dumetorum, Canthium sp., Flacourtia, Acacia catechu (with small hooked stipular spines and very finely compound leaves), Jasminum malabaricum, Carissa carandas, Pflueggia leucopyxis, Zizyphus rugosa &c.

Tinospora cordifolia (?) a woody, now leafless vine, sends down slender, cord-like aerial roots. Several of the shrubs, including the rather abundant Callicopteris, tend to be scandent.

As the base of the hills are approached, the bamboo becomes definitely dominant, the vegetation more closed,

and Bombax, with conspicuously ~~thorny~~ prickly trunks, become conspicuous and common.

As soon as the actual hill slopes are reached, the bamboo almost drops out, except in the flat valley bottoms, where it remains quite dominant.

On the slopes the vegetation changes to a dry deciduous forest, not especially thorny. Bombax disappears completely.

In the vicinity of Kanheri Caves, at about 150-200 m. the forest contains Pongamia, Diospyros, Vangueria spinosa, Wrightia floribunda, Sterculia urens, Sterculia colorata, Erythrina, Morinda tomentosa, Odina ~~wodier~~, Holoptelea, Bombax malabaricum, Gardenia sp., Plumeria rubra, etc. as trees. Shrubs are Euphorbia neriifolia, Capparis sepiaria, Vitex negundo, etc. At this altitude only Vangueria, Vitex, Morinda, and some of the Pongamia have leaves. Above about 200 m.

more of the trees have leafed out, showing how new the leaves are by their bright green. ~~At the altitude of the caves only Bombax~~

Above the caves Plumeria rubra forms trees 10 m tall, leafless but in bloom. Sterculia colorata, Wrightia, Morinda, Euphorbia, and Odina are in young fruit or flower.

These slopes are a massive occurrence of a volcanic breccia or pyroclastic material. Over considerable areas in the vicinity of the caves degradation has been carried to its ultimate stage. There are extensive areas of completely bare rock. Clumps or bushes of Euphorbia neriifolia, looking like chollacactus, are scattered here and there. Patches of grass, Pachrenum ciliare, Tripogon, and a few other herbs are completely dry. There are desiccated pools which during the season just after the monsoon contain a

1956 India

special flora. Not a trace of a plant is to be seen there now. Grasses, especially Tripogon, are common in the rock crevices, but now completely dry.

At this season most of the plants are in a leafless condition. However, the total rainfall is said to be about 30" annually.

The undergrowth in this dry deciduous forest is almost all of a species of Strobilanthus with a singate habit of growth and persistent large dry leaves. Burning is very widespread.

In the soft pyroclastic rock are numerous artificial caves, excavated by Buddhist monks 2500 years ago. Some of them are very impressive. Relief carving on the walls, especially around the entrances, is quite beautiful. Bats are numerous and their odor and squeaking are very obvious.

The age of these caves gives some measure of the extent of human influence on this vegetation.

1956 Ceylon

April 6 - Colombo

Edges of Galle Face Green
The green, itself, is a lawn principally of Cynodon dactylon, but with a number of weeds, including Borreria sp.?, Hedyotis sp., Chaptalia amabilis etc. prostrate from mowing. Around the inner edges along the fence of the military reservation, a number of weeds make up a mixed vegetation

Oldenlandia umbellata L.

368/19 Hedyotis
common in weedy places

Along the railroad tracks in the Fort area Boerhavia is very abundant. When left undisturbed it carpets the ground and the extensive diffuse leafless inflorescences form a layer 15 or more cm. thick above the rest of leafy parts of the plant. This is very different from anything observed in the Pacific.

70 Boerhavia erecta L. (Det. D. Nicolson)
abundant along railroad tracks

Orange and pink varieties of Lantana camara, Stachytarpheta indica, Sida sp., Tridax procumbens, Boerhavia diffusa, Mimosa pudica, Borreria sp., Hedyotis sp., Ipomoea pes-caprae, etc. are common. Scaevola serica grows along the fence. The Ipomoea pes-caprae is the same form as observed in Hikkaduwa and in Bombay.

procumbent; flowers lavender.

stems ascending, flowers whitish.

1956 Maldives.

April 10 - approaching Malé Islet from slightly north of east - conspicuous parallel but rather broken slicks, irregularly distributed, running north and south, perpendicular to the wind-direction, roughly parallel to direction of reef, some mile offshore. Wind a gentle breeze, sea with ripples and very small swell (in at least two directions). These slicks at irregular intervals of from 50 to 200 m.

The Admiralty chart of Malé ( ) does not seem to be very accurate - at least it is hard to relate the islets shown on it to those actually seen.

All islets visible seem pretty well covered by coconuts. Hulule has brush on its northeast extremity. Also along its seaward side there seems to be a shrub fringe.

Keane Islet seems to be covered by low shrubby vegetation, no tall trees. Seems to be rocky, without much beach

Malé Islet has rather few coconut trees, as seen from the seaward, but is well wooded. Variation in color suggests mixed forest (Admiralty chart ~~pointed out~~ pointed out plantings). Town ~~occupies~~ occupies eastern end & broken fringe covers top of beach. Entire [illegible] has very [illegible] Worth visit for half hour to be worthy.

Lagoon seems to have islets scattered in it.

Outer part of reef exposed at mid-tide on both sides of channel, but not at all blank in color. Islet has coconuts and several kinds of small trees. Pemphis on inner side.

Lagoon side of Malé I. is built up like a city with white 2+3 story buildings of masonry. Few trees in this part.

1956 Maldive Is.

Ships anchor in part of lagoon directly in from Male I., between it and several small lagoon islets opposite. Tugs Arlt anchored within 200 yards of shore, but in deep water. 30 fathoms. The lagoon front of Male I. is walled up and built into an inner harbor for small boats. English flying boat tied & buoy about 500 yards from shore. Most of the wall masonry is rough but the part immediately around the entrance is concrete. The wall is said to be 300 years old. Except for the concrete part at the entrance it is made of stone without mortar and must be repaired after each monsoon. During the S.W. monsoon the lagoon is very rough and protection for small boats is necessary.

Today the lagoon is like glass. There is almost no breeze. The sky is partially cloudy. Temperature and humidity are high

Cultivated plants seen in Male.

. Codiaeum variegatum
. Mangifera indica
. Jasminum grandiflorum
. Mirabilis jalapa
. Pseuderanthemum carruthersii
. Jasminum sp.
. Capsicum sp.
Acalypha amentacea v. circinata?
. Areca catheeu
. Cordyline terminalis
. Ceiba (Withered)
. Carica papaya
. Eugenia aquea? fruit eaten
. Nerium indicum
. Nerium oleander
. Hymenocallis littoralis
Crerpsis?
. Casuarina equisetifolia (trimmed into hedges)
. Piper betle
. Pisonia grandis? (doubtfully ours)
. Plumeria speciosa (?) (Singapore)
. Phyllanthus nivosus?
. Cocos nucifera
. Manihot esculenta
. Hibiscus tiliaceus
. Saccharum officinarum
. Zingiber zingiba
. Erithrasia trifolia
. Pasiflora edulis
. Thespesia populnea
. Phoenix dactylifera

'956 Maldives

- Artocarpus altilis
- Bougainvillea spectabilis
- Moringa oleifera
- Psidium guajava
- Aleurites moluccana
- Tecoma stans
- Antigonon leptopus
- Citrus sp.
- Ocimum sanctum
- Punica granatum
- Annona
- Catharanthus roseus
- Lagerstroemia indica
- Hippeastrum puniceum ?
  (pale vermillion)
- Damanea saman
- Peltophorum ferrugineum
- Pseuderanthemum carruthersii
  var. atropurpureum
- Musa sapientum
- Clerodendrum sp.
  (long tube - siphonanthus?)
- Delonix regia
- Pandanus sp.
  (large, edible fruit)
- Pandanus sp.
  (small, lvs. spineless)
  ("kasima" prized for odor of staminate fls.)
- Vitis sp.
- Hibiscus - ornamental hybrids.
- Muntingia calabura
- Melia?
- Averhoa bilimbi

Courtyards are covered by a smooth layer of a coarse sand composed of Halimeda fragments and a flat foram, shell fragments, etc.

Thespesia is the common tree along lagoon shores. Wood used in boat construction, for gunwales and free board. Lower parts of boats of coconut wood; "hirundu" is Maldive name for Thespesia.

The general aspect of Male is one of extraordinary cleanliness and order.

The town is surrounded by an old wall just over 6 feet high. Similar but lower very well kept walls line all streets and separate gardens.

Most lawns are of Lippia nodiflora.

1956 Maldives

April 10 - Male Islet
coral soil in waste places

36821 .Brachytarpheta jamaicensis
occasional in open places
1 22. Thuarea involuta
open places
1 23. Kalanchoe pinnata
occasional
2 24. Ochrosia oppositifolia
occasional near outer beach

3 25. Clerodendrum inerme (L.) Gaertn
occasional near outer beach

1 26. Ficus Empoxensis Hegne?
one tree seen on playground
near outer beach.
2 27. Calotropis gigantea
common

2 28. Indigofera tinctoria L.
common locally
3 29. Nostoc
common locally on trees on
1 30. Euphorbia ~~pilosa~~ Hookeri (Sherbeang Hooker) (Archer)
occasional & common locally
1 31. Portulaca quadrifida L.
one local

flowers deep blue-violet.
"malembu"
very prostrate, leaves
stiff.
ovate leaves very fleshy.
"fatingasa fala"
small tree; flowers
white, ovaries
continue to flower even
after fruits are well
formed. "dumburi"
low shrub; leaves
fleshy; flowers white
with maroon stamens
and style. "dungeti"
spreading tree with
round crown, stout.
"~~fiti~~" "fili"
shrub to 2 m. tall.
corolla and corona purple.
follicle fleshy at time
of dehiscence. "muva"
low shrub, flowers
dull salmon color.
"gulunifida"
prostrate, deep purple.
"bingbinna"
prostrate, fleshy, purple.
"mahunufida"

36832. Hibiscus tiliaceus
common on seaward flats

+ 33. Terminalia catappa
occasional in scrub at top of seaward beach

3 34. Scaevola sericea Vahl
dominant in scrub at top of seaward beach

4 35. Premna obtusifolia
common in scrub at top of seaward beach

2 36. Guettarda speciosa L.
Occasional in scrub at top of seaward beach.

2 37. Wedelia biflora (L.) DC.
Common in the edges of scrub at top of seaward beach

2 38. Albizzia lebbek
one tree seen on open flat at end of island

2 39. ~~Convolv~~. Merremia dissecta (Jacq.) Hall.f.
climbing in scrub at top of seaward beach

2 40. Cyperus rotundus L.
Low waste ground near lagoon

well-formed tree with erect trunk, rounded crown. flowers yellow, turning red center
maadon "dirka"
tree 5 m. tall; flowers white, fruit immature, sharply bicarinate. "midi"
shrub 3 m. tall; flowers purplish toward center, fruit white fleshy.
"maga"
large shrub or small diffuse tree, aromatic when broken; flowers greenish white, fruit turning blackish.
"dakarda"
small tree, 4 m. tall, flowers white; fruit immature.
"wunni"

sprawling resinous smelling herb: flowers yellow. "miriki"

enormous spreading tree. fruit not quite mature. "ritikas"
herbaceous vine, rather extensive, corolla campanulate, white with carmine center.
colony spreading from deep rhizomes. "dandukani"

3684 1. Gr eragrostis herbacea L.?
occasional

42. Datura metel L.
occasional

43. Ricinus communis
common

1 44. Amaranthus viridis L.
common

2 45. Ficus infectoria
occasional

2 46. Sida humilis Willd.
occasional

1 47. Portulaca oleracea
common in open places

2 48. Fimbristylis cymosa
common in open bare places

2 49. Turnera ulmifolia L. var. elegans (Otto) Urb
common

1 50. Euphorbia heterophylla
very common

1 51. Lygodiella nodiflora (L.) Gaert
common locally

52. Thespesia populnea (L.) Sol. ex Corr
common generally, especially along lagoon shore

(to p. 130)

shrub 2 m. tall.
"~~mtaifa~~" "olhafa"

low spreading gray-green herb, flower pale cream color.
"hudu orami"

shrub to 2 m. tall.
"raing amanaka"

eaten "masagu"

banyan-type tree, but multiple trunks and aerial roots not much developed. "dumbu"

prostrate, flowers orang.
"vodikka"

prostrate, fleshy, brownish green. eaten by people as pothel "raidgeda"

densely caespitose, roots with pleasant peppery odor

herb up to 0.5 m. tall, branching; flowers showy yellow.

herb up to 0.7 m. tall, milky; bases of bracts scarlet.

flowers yellow.
"miriheva handidi"

tree 8-10 m. tall, flowers yellow. Wood used for freeboard of boats.
"hirundu"

1956 Maldives

Information from Mr. Ibrahim Ali Didi

Hurricane near end of 1955 blew down coconut and breadfruit trees, threw up large stones on to reef, built a natural breakwater on Velladu I. a Milledum Madduatoll atoll to a length of 200-300 feet long, 30 feet wide on reef sufficient to shelter small ships. Took about 3 months to open an entrance for ships through this. Several other islands affected the same way. This breakwater formed in 2 hours. Would have taken a thousand people a year. Mainly of small stones and sand, a few large stones.

One island had a passage cut through it - 8-10 yards wide, fishing boats can pass through. Molladu I., Milladum Male atoll.

Elephantiasis

Leprosy
Patients isolated.

Venereal diseases unknown in Maldive 40 years back, came from outside spread very rapidly.

Mosquitoes formerly not very troublesome, but in recent decades have become very much so. Do not seem to respond to ordinary precautionary measures such as covering standing water, cisterns, etc.

Crows occasional on Male Not found in all atolls, only certain

Land crabs and hermit crabs common. Here the crabs not only eat the fleshy of the pandanus fruit but bite open the cells and eat the seeds, too.

Two examples seen of a large heron resembling the great Blue heron of Male I.

April 10 Male I. (cld)

76893. Paspalum vaginatum Sw.
local back of lagoon shore

54. Sida humilis Willd.
rare in dense weedy sod back of beach

3 55. Emilia sonchifolia var.
common in dense weedy sod back of beach

2 56. Phyllanthus debilis Kl. ex Willd. ssp. P. maderaspatensis
common in weedy places

2 57. Hedyotis umbellata (L.) Lam.
common in dense weedy sod back of beach

2 58. Lippia nodiflora L.
common in dense weedy sod back of beach, also generally elsewhere

2 59. Boerhavia erecta L.
occasional

2 1 60. Eragrostis amabilis (L.) W. & A.
common locally

2 61. Phyllanthus amarus Sch. & Th. or P. maderaspatensis
occasional

2 62. Indigofera tinctoria L.
occasional

2 63. Cleome indica (L.) Gaertn.
common

1 64. Panicum Brachiaria subquadripara (Trin.) Hitchc.
occasional in dense weedy sod.

2 65. Tribulus procumbens L.
very common, generally

forming a loose mat, sterile.

prostrate flowers pale orange.
"weredikka"

leaves glaucous, somewhat fleshy, flowers pinkish purple, only slightly exceeding involucre. "kirikulla"
"kaalu kumba"

prostrate, flowers white. "emmudi"

very prostrate; flowers white. "kiridati"

"kumundagani"
stems ascending; flowers pinkish.
"tumbuli vina"

low stature may possibly result from trampling.
flowers salmon.
"kang kiti"
"vina" (small grass)

"onovina"

ray-flowers white
"manina"

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	3686.	Alysicarpus vaginalis (L.)DC. common in dense weedy sod back of beach	prostrate.
1	67.	Euphorbia hirta L. common	flowers white "kiruting"
2	68.	Nothosaerua brachiata Wight common in dense weedy sod back of beach	prostrate, flowers white. "handuhuffsila"
1	69.	~~Euphorbia~~ Boerhavia repens L. (=[abnormal prickly stalked] Chgo) rare in dense weedy sod	prostrate, purplish. "bunuda gondi" (different kind)
1	70.	Boerhavia repens L. ? rare	prostrate; flowers pinkish. "bunuda gondi"
1	71.	Acalypha lanceolata Willd. ? locally common	
1	72.	~~Acalypha~~ Micrococca mercurialis rare	somewhat succulent
1	73.	Phyllanthus moderaspatensis L common	"kudikiti"
2	74.	Vernonia cinerea (L.) Less. common	flowers purplish. "walukafa"
		April 10 - Male Atoll, cultivated in gardens	
2	75.	Zizyphus jujuba (L.) Lam	small tree; fruit edible. "kunivar"
1	76.	Eugenia ~~aqueda~~ javanica Lam	large tree; fruits white, juicy, pleasant flavored. (also a pink fruited form)
1	77.	Phyllanthus niruri Bull.	diffuse shrub, stems leaves at top slightly variegated.
2	78.	Pseuderanthemum carruthersii Seem.	shrub 3 m. tall. corolla white, crimson dotted at throat.
1	79.	Codiaeum variegatum	common many forms cultivated "dunfulhai kapitan"

1956 Maldives

34080. Acalypha amentacea var.

x 81. Jasminum azoricum L.

x 82. Jasminum officinale f. grandiflorum (L.) Kobuski

low shrub, leaves reddish.

climber, flowers white very fragrant. "gamma ma"

climber flowers white fragrant. "vandu ma"

1956 Maldives

Apr. 11 - Anna I.

Small islet in lagoon with rather sparse growth of coconuts, a few fairly large trees (Pisonia?) and a rather irregular row of Pemphis etc. at top of beach. Interior seems rather open. As far as can be seen from 300 yds away. East, the entire islet is sand. North end has no coconuts, but low mixed scrub forest. This rather open.

A seal said to have been found and killed on Nilandu atoll. (atoll F) Not known in Maldives previously. ~~Skin~~ Pieces of skin brought to Male.

Once a crocodile was found on Milladu Male atoll (atoll N).

Turtles are protected. To kill one a permit must be secured from Male.

Said to be two varieties of edible Pandanus.

Domestic animals - chicken cows goats cats

April 11 - Kuda Badoo I.

Largely covered by coconut grove. Fringe at top of beach of Tribulus Tiliaceus, with Hernandia sonora back of it.

A small hope-site. - 2-3 people stay here

Areca and Cocos in dooryard.

A few small breadfruit trees but these look rather chlorotic. One poor Tamarindus indica.

Ground rather bare in much of grove, casting of earthworms (?) very frequent.

Track seems general in interior

Nasturtium common in open places.

Pandanus tectorius a something similar occasional - very long leaves.

Strip of scrubby wood back of top of beach largely Hibiscus Tiliaceus with Guettarda, Pemphis, Hernandia, Calophyllum & Messerschmidia. a little Suriana Tournefortia

In the interior are scattered trees of Hibiscus, Calophyllum.

Pandanus.

In openings patches of Boerhavia.
Young coconut seedlings in spots places.
What appears to be Vigna adenantha seedlings scattered in plentiful abundance Messerschmidia, Cenchrus and Tacca general but not forming a dense cover. Ipomoea occasional. Portulaca occasional.

The entire islet seems composed of fine ~~white~~ sand with some coral fragments. The general level is about 1 foot above high tide and a small escarpment is cut at high tide level.

Some pumice found on beach but not abundant. In about 30 m. the land becomes lower so that the interior level scarcely could be much more than high tide level.

In the interior the soil ranges from dark brown to black when moist. This is at least 3 dm or more deep. In it are abundant pieces of phosphate rock also a few

Tournefortia, Guettarda, Hibiscus tiliaceus, Terminalia, Scaevola, dead coconut leaves.

General evidence of burning of coconut trees.

A few small Schoenus apostifolia in interior. A patch of Tournefortia near house. The Cenchrus is all sterile - small plants like small forms of Cenchrus asiaticum.
Pandanus in interior has large heads, oblong, perhaps 1 foot by 8". eaten "kariko"
Small sp. called "bokiso" not eaten. Here only at top of beach.

On south side the beach is eroding away, exposing an extensive mat of coconut roots. Water sloshes up far under the sand among these roots. Shallow water with sand bottom extends out about 25 m. suggesting this much erosion. Coconut trees apparently uninjured until they fall over.
Chickens are abundant and scratch up surface soil.

1956 Maldives

In the lagoon are bands of reef and large patches, but no small patches seen. They are said to occur frequently, though. The large patches and bands are conspicuously sandy, with irregular growths of coral

April 11 - Funamafuri I.
Islet on reef - inner shore a sandy beach.

Coconut trees rather few, much scrub forest. Pemphis common, especially around outer shores, Scaevola on inner shore.

Well near center of islet lined with concrete - water level about 3' down from ground level. Water perceptibly brackish, but drinkable. Not used for drinking.

Pandanus here, even in interior, small inedible species, except one tree near house.
On north ~~side~~ of islet:
General shrub layer about 2 m. high, mostly Scaevola, some Guettarda ~~trees~~ saplings Ochrosia seen.
Scattered trees of Pemphis, Terminalia catappa, Pandanus, a few Cerbera, Messerschmidia
In open or sparse places, Wedelia

Herbaceous layer scarcely developed. Some Fimbristylis common in open places, same Boerhavia
near seaward
Near outer end a small clumps of mangroves - apparently growing on a dry pebble ridge just back of beach.
Seems that a storm may have filled the coral gravel in around these trees, as normal bases not visible - trunk simply protrudes from gravel. Largest trees dead, medium ones very sick looking, smallest look healthy.

Outer end of islet a loose pebble flat covered by a thicket of Pemphis, Cordia and Pandanus. No undergrowth but many dead Pemphis branches.
Some pebble lined pools with mangroves just back of sharp beach ridge ranging from pebbles to cobbles, very sharp, unworn

fragments. Some young mangroves under trees.
Thicket varies toward south side becoming locally dominantly Cordia, then Cordia-Pemphis, then Pemphis. On south shore are giant old Pemphis stumps, cut back many times very bushy, up to several feet diameter
Cordia same habit, even larger.

No sign of platform except that about 30' out from shore (at high tide) are some much eroded remnants of rock with points protruding above high tide. This whole end of the islet is coral gravel.

Inner end of islet seems more luxuriant, possibly because of sandy soil. Here the trees are mainly Hibiscus, Calophyllum, Ficus, Terminalia.
~~and large stand of Pandanus~~.
Some Morinda and a bushy Vitex and Scaevola, large S. of Pandanus

Two crows seen here. From a distance what appeared to be a flock of white terns, but did not get close enough to be certain.

Fanucolafuri Islet — on east reef.

Central part a dense grove of coconuts, open to the lagoon beach except for a few scattered bushes and small trees.

The grove thins toward both ends so that the fourth part on each end is noticeably sparse and with a prostrate scrub or scrub-forest, probably mostly Pemphis, lining the shore and covering the end of the islet.

This is especially dense on the southwest corner, seems a bit "wind sheared", possibly effect of southwest monsoon.

Interior of grove in center looks rather dark. At one point the outer shore can be seen under the trees from the lagoon.

The coconuts on the end are very small trees.

Sandy beach may be seen the entire length of the lagoon side, but in the center a mat

of coconut roots is being undercut by waves.

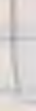
Lagoonward from this islet and others along this reef is a second belt of reef, a hundred yards or so wide. This is separated from the wide outer reef by a belt of blue water twice or more this width.

Today the weather was scorching hot and so near a dead calm that it was scarcely possible to keep a sail filled for long enough to get any push from it. There were only a few tiny flecks of cloud. At about 4 or 4:30 slightly more of a breeze came up, as well as a few scattered larger cumulus clouds.

~~H~~ Hulule I. — also along outer reef. Densely planted to coconuts but has an avenue cut longitudinally. Northy end has low scrub with only small coconut trees, Pemphis in clumps and as isolated trees, as

well as some long rows along much of lagoon beach. Scaevola in most of the intervals. In center a short stretch of open beach where houses are. Some places show beach erosion and suspended roots of coconut roots - this where unprotected by Pemphis trees. South end has coconuts almost to tip. Kukuele has an avenue cut for its full length

Small scrap of land south of this on reef has only scrub (Keane) Islet



1956 Maldive Is.

April 16 - Kuda Badoo Isat

Sample bag contains pumice picked up on beach, phosphate (?) rock found abundantly scattered over soil in interior of island, brown soil taken 6-8" down from the surface in an apparently uniform layer over 1 foot thick but of undetermined thickness, ~~black soil~~ this from a semi open place ~~20 m~~ back of beach on north side of islet; black soil from 8-10" depth in an apparently uniform layer more than one foot thick in coconut plantation, apparently the usual soil in the plantation; and a sample of beach sand from the north beach.

36883	Taeca leontopetaloides (L.) very common throughout coconut plantation	O. Kuntze	tubers used to make starch. "hirit tala"
1	84. Hibiscus solandra L'Her. rare in plantation		erect
1	85. Moringa oleifera Lam. one tree in plantation		sterile tree 4 m. tall leaves and fruit eaten as potherb "morunga"

Male atoll

36886. Cyperus conglomeratus Rottb.
one clump at top of beach of fine calcareous sand

2 87. Calophyllum inophyllum
common in and around coconut plantation

2 88. Morinda citrifolia s. lucida
occasional in planted coconut plantation

2 89. Hernandia sonora L.
common in beach ridge scrub forest

3 90. Suriana maritima
occasional at top of beach

2 91. Pemphis acidula Forst f.
abundant at top of beach, growing in sand.

3 92. Messerschmidia argentea
occasional at top of beach, rare inland

2 93. Cassytha filiformis L.
climbing over trees, not abundant

3 94. Dolichos lablab L.
climbing in bushes and trees and creeping on ground in open or partially open places

1 95. Canavalia rosea (Sw.) DC
rare, in semi-open places.

1 96. Flagellaria indica L.
common in coconut plantation

caespitose, erect; spikelets very pale.

small tree "funa" wood useful.

shrub 1.5 m. tall, "ahi"

tree 6 m. tall, leaves glossy, firm; fruit surrounded by loose fleshy inflated envelope, orifice circular, not toothed.

shrub 1 m. tall. "halaveli"

densely branched shrub; flowers white. Wood used for keels of boats. "kuredi"

shrub 2 m. tall; leaves pale silvery green, flowers white. "bosi"

stems green & yellow; fruit green. "vela buki"

flowers magenta, keel straight, white. "dubimeri" Eaten by some birds.

shrub 1 m. tall, sterile. "ranawa"

erect very young shoots common, no mature plants seen. "vihalla gondi"

1956 Maldives

36897 Abutilon indicum (L.) Sweet
occasional in coconut plantation

1 98. Crotalaria retusa L.
rare in coconut plantation

99. Pandanus fosbergii St. John Hdbk type
occasional in coconut plantation

(992 (fruit from market in Malé)
↳ Probably related Pandanus drupaceus

Calymperaceae

99½ moss Calymperes hyophilaceum C. Müll
base of coconut tree

det. H. A. Miller

[illegible]

erect, scarcely branched weak shrub; flowers orange, mostly caducous.

1 ma Male leaves eaten in part

erect herb 1 m. tall; bud yellow, pinkish without. "vihà giçuni"

Pan. Sp. 15:331, 1961

large-stemmed tree up to 6-8 m. tall; leaves to at least 4 m. long; fruit head oblong, at least 3 dm. x 1.9 dm. none seen mature (2 seen picked up on ground nearby); fruit said to be edible. "kaukeis".

This is something of the P. tectorius relationship but probably distinct from P. tectorius. Has apparently nothing to do with the small fruited wild plant seen growing around the beach ridge.

April 1 - Furannafuri Islet

36900. Barringtonia asiatica
2 one large tree and many seedlings in thicket in from beach

2 01. Boerhavia ~~diffusa~~ reflexa L.?
common along trails in sparse coconut plantation

02

1 02. Ipomoea tuba ?
very rare in Cordia-Pemphis thicket

5 03. Bruguiera ~~parviflora~~ cylindrica (L.) Bl.
common around saline pools near outer end of islet

7 04. Morinda citrifolia
occasional in coconut plantation

1 05. Cordia subcordata Lam
rare along beaches, abundant in thickets on very stony ground, ~~seaward~~ end of islet.

tree 3 m. tall, widely spreading; fruit 4 sided, up to 8 cm. diam. abundant on ground, chewed up by crabs. "kimbi"

all plants seen were of this form, no extensive creeping ones seen at all. "buranda ganli" not eaten.

2 twines; sterile.

small tree, flowers cream color, "kandu" embryo radicle boiled and eaten.

4 shrub 2 m. tall; leaves glossy; flowers white. "ahi"

small tree, flowers bright orange red (not collected). Wood much used. Many enormous sprouting stumps of pollarded trees. "kaoni"

1956 Maldive Is.

April 12 - Male Islet

3 6 9 06. Lemna oligorrhiza Kurz?
3 covering surface of water in well in guest house yard, water about 1 m. below surface of ground.

2 1 07. Averrhoa bilimbi
commonly ~~cultiv~~ planted around houses

1 1 08. ~~Hobis~~: Azadirachta indica A. Juss.
planted

3 09. Hedyotis umbellata (L.) Lam.
5 common in grassy area on top of old fort.

3 10. ~~Comp.~~ ~~Inula~~? Launaea pinnatifida Cass.
7 common in grassy area on top of old fort.

2 11. ~~Legum.~~ Indigofera enneaphylla L.?
common in grassy area on top of old fort.

2 12. Cyperus bulbosus Vahl
common in grassy area on top of old fort.

1 13. Mentzingia calaburu
in crevice in wall of old fort.

1 14. Pilea microphylla
in crevices of walls along str

1 15. Lawsonia inermis L.
planted in park

Leaves said to be crushed in milk to impart a red color to palms of women's hands.

small tree; flowers on large branches, very dark red.

spreading tree; flowers white, very fragrant. "hiti".

prostrate; flowers white.

leaves glaucous, rather fleshy; flowers yellow. Used as potherb. "hula fila".

prostrate; flowers bright red.

roots and tubers very fragrant, sometimes used as incense. "gola kulandumu".

small shrub. Fruit eaten. "jaam"

fleshy. yellow-green.

small tree 5 m. tall; flowers with petals yellow, odor said to be very good in morning, at midday not especially pleasant.

1956 Maldives

36916. Pandanus maldivensis St John Bot. Gaz. 110: 331, 1961
forming thicket on back of beach.

April 10-12 – insect collection all from Malé Island except the worker ants, which are from Farammafani Islet. The ants were on vegetation.

The Malé I. collections were from around lights except the two millipeds (?) which were around the roots of plants.

The scorpion was crawling in the house.

General observations on Malé atoll:

No remnants of platforms seen.

No beachrock seen.

Beach erosion active in various places, exposing mats of coconut roots and undermining them.

Most reef surfaces covered by sand.

East reef very wide.

small tree, 4-5 m. tall, stems slender, with tendency for leaves to persist and clothe stems; fruiting head cylindric, turning red on ripening. Not eaten nor used for anything. "Boki"

There are several kinds of lizards, including a very fierce looking little monitor (?); the common house gecko is frequent. No Maldivian name for lizards, according to informant.

Birds are very scarce.

Rats are common.

Pemphis and Suriana both grow in sand, the Pemphis by far the most abundant.

Around islands planted to coconuts there is usually a border vegetation of bushes & small trees. Ends of islets tend to have fewer and smaller coconuts and much scrub vegetation.

1954 Maldives

Male is cit, proper, has 8000 people.

The economy is still out of balance but is improving. More fishing boats are being built.

The exports are
Maldive fish
Coconuts (nuts, to India)
Copra (some doubt about Ceylon)
coir fiber
cowrie shells.

The principle imports are
rice onions
flour chilis
sugar curry materials
tea
non-food items

In 1954 the export of Maldive fish was 34776 cwt
In 1955 35341 cwt

Maldive fish is produced on all atolls, especially Fadiffolu. It is bonito. The fish is boiled in water with a little salt. Then it is smoked 12 hours or more. Then dried in sun a week or more. When ready to bag for shipping it is sprinkled with ash

The Maldive alphabet is 500 years old, is peculiar to the Maldives. It is read from right to left.

Printing done in Malé is apparently by some sort of lithographic process.

During the 3 days, April 10-12, the weather was hot, very much so during the day, slightly cooler at night but not cool, and an absolute dead calm. This was said to be rather unusual, even for this season.

In recent years a shortage of bait-fish for catching bonito.

1952 Ceylon

April 16 - flight from Colombo airport eastward to Singapore

Country south of Colombo is mosaic of coconut plantation, with trees in regular rows, mixed coconut and jak fruit and breadfruit and rice paddies. The rice paddies form an intricate dendritic pattern following the drainage lines - the valley bottoms are flat and checkered into individual patches. The land between is rolling, gradually becoming more hilly eastward.

A very few miles to the east the hills get high enough to have patches of second growth and shifting cultivation.

Then a series of north and south ridges with first some forest, then a mixture of tea plantation, clearings, and patches of woods. Inland the tea becomes more and more dominant. Then clouds

cut off the view until the higher mountains are reached.

These emerge from the clouds west of Adams Peak. They are mostly in tea, with small patches of wood and thicket, bare rock cliffs, and apparently rather continuous forest in the complex of rugged mountains immediately surrounding Adam's Peak.

The lower hills south of this are mostly in tea, with some shifting cultivation and patches of grassland.

Eastward of this the same pattern continues with a few higher hills wooded. The higher mountains southeast of Adams Peak are wooded, their slopes largely in tea. South eastward is a basin with small hills covered with tea, patches of thicket, shifting cultivation and some rice in the valleys.

Eastward the higher mountains have more and more grassland on

their slopes, wooded near summits and in ravines. Upland plateaus tend to be partly grassy.

The lower country to the south of this is at first an irregular mosaic of wood and clearings, with probably some teak. Then, as flatter country is reached, this is generally wooded, rather evenly except for large patches that appear to have been cut over and grown up to dense thicket. Hills here seem to be covered by scrub-forest with rocky outcrops bare & grassy. Perhaps the large patches are prehistoric "tanks" - reservoirs, as one or two of similar shape have water in them.

Farther eastward the country is very flat. There are patches of shifting cultivation and various stages of regrowth, some obvious old dry "tanks". Far to the north the hills and mountains have become more grassy.

Here and there in the flat

country just south of them are what appear to be clusters of small grain fields of a tan color.

The forest, locally varied by shifting cultivation and small light brown patches, continues eastward.

It becomes thinner and with drier aspect, eastward. Terrain is generally flat with scattered abrupt small hills. These become fewer eastward.

Then the forest becomes deciduous in parts in a broad valley near the coast, with green forest on higher ground. Some open country in this valley looking like tidal marsh. Broad strip of reddish tan alluvium at river's mouth, continuing much narrower northward.

Northward just back of coast a series of small round lagoons. North of these are bright green patches (rice?) in similar position.

Most of country northward as far as visible is wooded, except for these bright green patches.

1954 East Indies

April 16 - Enroute Colombo to Singapore

At 11:15 (Colombo time) passed over a fair sized island, low hilly, appearing largely wooded but with some grassland and clearings in its southern or southwestern parts. Mostly obscured by clouds. Limestone? ~~East coast of the~~ Northeast coast of this island very irregular and with various tiny islets. Many small clearings and patches of grassland near coast, good forest inland. Eastern part or perhaps southeastern with larger grassland areas, also with some small areas of mangrove, especially between main island and a ~~small~~ small satellite directly east.

Sumatra - The south coast is low, with a cleared, or at least relatively open strip back of the beach, and sloughs paralleling the beach. The mouth of a large winding muddy river, with a hook-like delta and a village with cleared land at its mouth. One branch of this river comes from the south or southwest, tightly meandering, another from the east meandering but less so.

The general lowland country is densely forested, but with scattered clearings and a village or two along the rivers. Some small dark streams meandering in the coastal forest. Clouds more and more frequent inland. Country forested as far as can be seen.

Country becomes hilly, still forested but with some cleared grassy areas. These mainly seem to be on lower slopes of valleys. Thick high cumulus clouds in interior of island, many

1750 East Indies

thousands of feet high.
Eastward is an area that seems to be a plateau a peneplain cut by ravines. This is largely grassland with ravines wooded. South of it wooded hills. Then more clouds. Then large open areas with roads and villages, some forest on hills, some bright green rice in flat valley bottoms.

Then a gently eastward sloping plateau going down toward the coast. Mostly grassy, with small ponds. Cut by several deep valleys with flat bottoms, green with rice. Coast is hilly, hills brownish grassy, with green flat land between hills. Many villages.

Turning slightly, following coast more & less the same sort of country continues. The plateau becomes more intricately dissected. Little wood in ravines. Ravine bottoms tend to be flat and in rice, though

many have no flat land. The plateau itself is generally in grass. Eastward, as nearly as can be seen through the clouds, it ~~[illegible]~~ gradually loses its identity and merges into wooded hills with patches of level plateau covered with grass, large irregular patches.

Then clouds, high, low, irregular cumulus.

Through occasional breaks in clouds country seems hilly, wooded, with ~~[illegible]~~ in places open ridges, large cleared areas.

Then rather flat country partly cleared, with a meandering very muddy river, winding and then turning northward to coast where it enters a broad estuary shared with another large winding river from more to the east. The flat lowlands back of this river mouth are densely forested except for strips of green

1956 East Indies - Sumatra

nice along the rivers and their ox-bows.

The general color of the forest is very dark dull green thickly dappled with lighter treetops. Visibility rather poor near coast. Some clearings just back of coast.

Small meandering streams reaching coast are pouring large amounts of mud into the sea - conspicuous brown patches near mouths of some, entire shallow coastal water a cafe-au-lait color.

Some of these coastal estuaries drowned, with numerous very short lateral branches.

Land mostly wooded, some clearings. Apparently mangroves along streams but hard to be sure.

No beach apparent along this entire coast, so probably what dark-colored coastal forest may be mangrove.

West end of large island presents a banded appearance with at least two wide strips of forest separated by light green strips of about equal width. These bands

in outline like the channel separating a small elongate crescent-shaped islet from the big island and parallel with the green bands. On the inner green band is a sizeable settlement. Back of this, the inland seems to be unbroken forest. Seems essentially flat and without rivers. Clouds make visibility rather poor.

Eastern shore of this island muddy also and without beaches. Certainly mangroves here. A small stream discharging a great amount of mud. Some lighter green area, possibly mangroves or some sort of swamp, just back of shore. Band of sparse mangroves actually growing out in shallow offshore water.

Where the mud comes from in the small streams on this island is not clear, as there is no apparent disturbance of the forest, and no large gradient to give streams much cutting power.

Curved shore of same island (?) swings eastward again. Same general pattern but lacking mangroves and with several larger estuaries. In this vicinity much cleared land - in rice? or some sugarcane? Many ~~sluggish~~ meandering streams and estuaries here, with considerable rice (?) & sugar(?) land as well as forest between them. Coastal waters muddy. Mangroves along coast and estuaries. Complicated mud- & sand-bars near mouths of estuaries.

April 16 - Approaching from west along coast toward Singapore.

The shores, at least westward exposed ones, have beaches.

Slopes back of them largely open. Too far away to be sure if grassland or planted. Dark forested strips must represent rivers or areas of swamp. Inland obscured by clouds.

A number of low wooded islands offshore.

More forest eastward but many large angular cleared areas. Beaches no longer apparent. Stream mouths rather muddy. More forest, probably swamp, and a large meandering estuary with a small city on its south bank, with obvious plantation land with rectangular pattern south of it all along coast, two main roads parallel to coast a little back from it.

Inland some ugly scars which may be tin mines(?) Land is regularly cut up.

1956 Malaya.

patches not as regular as nearer coast. But probably rubber.

Coast turns sharply more eastward, lined by a broad belt of mangrove. Then backed by plantations, judging by roughly rectangular pattern, probably rubber, extending inland as far as visibility goes. Much of this, however, could be forest, as haze is rather thick. Some low long wooded hills inland. Another large estuary with city east of it. Much open land, apparently grassy, inland from city, some wooded hills, then plantation. This on north side of ~~Malacca~~ Johore Strait, on mainland. Much apparently grassy land here, interspersed with large and small often angular wooded patches or patches of rubber. Then large area of plantation land, with a straight canal running east and west, ending eastward at a small crooked stream. Some wooded hills in plantations just to north. Then some rice land eastward,

then forest, with some cleared areas, especially northward, apparently grassland.

As plane turns southward country becomes partly cleared, partly wooded, in rather large patches, clearing becoming more abundant.

Then wooded hills with large reservoir. Then large areas of plantation forest and large red or green cleared areas, then mostly plantation, with some clearings.

Then extension of city on Johore ~~Singapore~~ Strait is approached. Singapore Island very much cut up into clearings, small and large patches of rubber, forest, grassland, patches of building and houses. Soil bright red.

City on far side of island. Parts of it have trees but few downtown, & in slummy crowded areas of small houses, or in areas of new apartment buildings.

Much shipping in harbor.

April 17 Bukit Timah forest
Singapore
Baker sup 3580'
Unlogged primary rainforest.

loose canopy 120'-150' occasional trees to 200' in ravines.

fairly defined layer of shrubs and sapling 2-4 m. spaced 2-10 m. slender. Rather little ground layer, these mostly seedlings Rattans scattered in shrub layer, mostly rather small, some very large. Litter layer continuous but thin. Soil gray-brown, no humus layer.

Ferns rather rare except along trail

Some of second layer trees are Queens Lumpongiana. Other species of oaks also found. (Would probably be Lithocarpus) stiff staminate spike, scaly cup & round umbella shaped fruit)

Taller trees, by far, on ravines, shelter on ridges. Shorea has beautiful lined clean trunk.

Flying squirrel clinging to trunk of tree half way up

rainfall about 100"

looks like brush on tree perfect protective color

No good separation between top and second layer about 120'

Lianes fairly well distributed but not forming continuous canopy layer. Some as buttressed. The second layer not continuous either, but together they in most places cover the ground almost completely.

Epiphytes and creepers common but not abundant. Ferns abundant along trails, in thin places, etc.

Large area of mixed fresh water swamp, secondary forest and hill tops with original large trees around reservoir forming water catchment area. This nearly 4000 acres, a part of nature reserve.

[Corner may have an unpublished description a phytosociological study of this area.]

1956 Malaya

April 17 - Singapore

3691/7 Emilia
2 bare ground near botanical gard

1 18 Gleichenia Dicranopteris curranii Copel ed Holtum
open hillside below
Bukit Timah forest
P. borsi Gaud ac. St John Pac. Sci. 17: 18, 19

1 19 Pandanus tectorius
edge of "dry" mangrove
swamp

The "dry" mangrove is a tidal swamp high enough to be drained much of the time. A tangle of Bruguiera, Pandanus (several spp. incl. P. conoideus), Dalbergia, Hibiscus tiliaceus, Excoecaria, Podocarpus (!), etc.

Unfortunately highway construction, rounding off a curve in the highway, has all but eliminated the only known colony of Pandanus conoideus, a curious species with a erected, boat-shaped leaf tip, very low habit and small fruit.

erect, flowers pale yellowish, leaves (seed sent to Baldwin)

forming tangles

small tree. fruiting head small, cylindric. red when ripe.

The low flat land near the airport is occupied by vegetable gardens and dwellings, many coconut groves.

Low hills of red soil have some rubber plantations but many of these are in very poor condition. Much of this land is abandoned and covered by Gleichenia linearis, Imperata cylindrica and brushes.

A few patches are planted to pepper (Piper nigrum) climbing on stakes.

Some fish ponds in flat land near airport. Some small mangrove along Straits of Johore

1956 Malaya

April 12 – Flight from Singapore to Malacca. (Seaward side of plane)

Along Strait of Johore, n Johore side, low-lying land is in mangrove, slightly higher areas in coconuts and some in rubber.
On Singapore Island mangrove along an estuary going up toward water reserve. Water catchment area solidly wooded. Around it many hills with gleichenia, a few cultivated patches, some dwellings, several [redacted] bright red erosion scar. Between this area and the Strait of Johore rubber plantations looking rather poor.

General pattern outside built-up areas is that hills are mostly bare with gleichenia and bush and level land in rubber. Low places along strait in mangrove.

In the part of Johore across from Singapore and Strait of Malacca the low flat land is mangrove. Most of the low hills appear to be in rubber, a few areas in grass (abandoned rubber)

A large estuary just west is surrounded by an extensive mangrove flat.

North of this an area of what appears to be pineapple plantations, perhaps several hundred acres with a few patches of rubber scattered in it. Some forest just east of this but mostly rubber. The rubber plantations have a dull drab-green appearance from the air. Difficult to be sure whether rubber or forest. North westward & westward toward the coast are some areas of coconuts mixed with the rubber plantations. A few small patches of forest, in from shape, hastily logged and burned. Then large area of solid coconut plantation along coast and for some distance in, but with what seem to be patches of swamp back of the coast. Coconut plantations show pattern of parallel rows.

The coconuts extend for some miles, with the belt of swamp (?) just back of an immediate coastal strip of forest. This swamp(?) seems to be in

1956 Malaya

geometrical blocks, to have been cleared and in various stages of regrowth. May not be swamp, but some form of shifting cultivation. The immediate coastal strip appears, on close view, not to be coconuts but some sort of forest, evenly gray-green, perhaps Casuarina ?).

Coconuts continue along coast but becoming more and more mixed with patches of rubber and small cultivated areas.

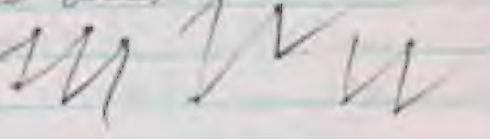
Locally cleared patches are very light colored, apparently sand. A few patches of mixed forest.

More and more mixed cultivation and villages.

Large estuary with some mangrove. Then coconut plantation with narrow coastal strip of forest. This may be mangrove, rather than Casuarina but looks more irregular than usual for mangrove.

Approaching large bedded coast has a wide mangrove strip, backed by either forest or rubber, then a road, then rubber. Beyond the point clearing extends to the sea shore. The land is a mixture of patches

of grass, coconuts and perhaps rubber. Coconuts becoming more dominant northward, then mixed with rubber patches. Here again a narrow belt of mangrove. The patches of coconut and rubber become mixed, mangrove backed by a belt of swamp ?) forest. Then plane green out to sea. Here a shallow green water, some conspicuous fish traps shaped thus



Then a number of small rocky islets, all wooded. These have a very narrow sandy beach at least on their southeast side.

Coast opposite these has a narrow belt of mangrove then a narrow belt of rice. Then coconuts, forming patches of coconuts mixed with rice and scrub of it. Then, northwestward, some large areas of rice and coconuts, a red soil low hill conspicuously contoured. Then large area of mangrove and nipa swamps near Malacca.

1952 Malaya

North of Malacca most of the lowlands in use, but patches of coconuts, mostly very small. Near coast coconuts are nearly continuous.

Hills inland between veg areas are wooded, perhaps rubber plantations.

Large area of secondary forest inland from Malacca airport. Also some young rubber.

Malacca airport - alt. 35'

- flight Malacca to Kuala Lumpur

Inland is a mosaic of rice, rubber, small patches of coconuts, a few small forests, a few bare fields, with rubber becoming completely dominant inland. The open fields are apparently being prepared for rubber planting. Low hills have areas of low brush.

Northward, small areas of rice following valley bottoms. Some patches of forest. Plane follows foot of mountains. Some areas of dark close woody vegetation - not clear what it is.

Northward, forest areas more extensive in low hills.

Open areas conspicuously contoured occasional. Also recently cleared patches of forest. Mostly rubber of various ages. Land flats along [illegible] river that may be tin workings - partly revegetated.

Mountains on east side of plain densely wooded.

Northward, west side, still mostly rubber, some open contoured fields (new rubber plantations?) and a few yellow-green grassy areas - lalang? Some forest on hills. A few areas of rubber(?) completely defoliated.

Low mountains with good mixed forest, a few small patches of grass.

Northward almost solid rubber except for one small forest area, larger in higher hills. More grassy areas northward.

Darker colored plantations in close were common - more like straight a winding - not clear what this is.

Then a basin with extensive tin working - ponds, sand or gravel cuts, pits, dumps. Scouring areas with sheet iron roofs exposed around mills etc.

1956 Malaya.

Hills round about grass and fern cover. This just west of Kuala Lumpur. Landscape for air dominated by tin workings. Flats partly revegetated.

April 19 - Malacca

36920 Emilia sonchifolia
weed around airport.

April 19 - Bukit Bruang above Kepong, ~~Kuala~~ Kuala Lumpur Selangor

3 71 Eugeissonia
abundant in undergrowth of hill dipterocarp forest, especially on ridges, latex said to inhibit growth of seedling of other species.

1 72 Shorea curtisii
~~Shorea~~ common in hill dipterocarp forest

3 73 Musa.
common in secondgrowth forest

3 74 Artis
common in "belukar" second growth

flowers light purple, scarcely exceeding involucre.

800' 250m acaulescent, caespitose; leaves ascending to erect, distally arching; petiolar spines, especially so in lower part; blade perhaps twice as long, entire leaf up to 5 m. long; inflorescence erect, pedicellate, in center of plant, up to 2½ m. tall, fruiting peduncle to 1.5 m. naked at time of fruiting; fruit ?ovoid.

1600' 590m common forest tree; leaves tending to be grayish

600' 190m small tree in tangled undergrowth, inflorescence pendent. small tree, does not sting.

1956 Nalaya

April 19 - Bukit Bruang, ridge above intake of Kepong water system, Kuala Lumpur.

We approach to the intake, along the pipe-line from the reservoir is through "belukar" or tangled secondgrowth that appears after clearing. This is a dense rather low wood of Macaranga, Mallotus, Arenga, Lapisium, Musa, Angiopteris, a few Cyathea, Artocarpus scortechinii, etc. These are tangled with quantities of vines, including Mikania scandens.

Occasional old primary forest trees may have been left, scattered here and there, their tall branchless trunks and umbrella-like crowns suggest their origin in the ~~former~~ primary forest. Several soft wood ~~trees~~ species of Shorea may come in ~~so~~ while the ground is still fertile enough for them to ~~grow~~ establish themselves ~~permanently~~. ~~They~~ They are then able to grow fast enough to be able to overtop the Macaranga,

Mallotus, etc of the ~~big~~ Belukar. If there are enough of these the Belukar may give way to something resembling primary forest.

The actual ridge, itself, has not been logged off, but has had some hardwood logs taken out 40-50 years ago. Most of the dipterocarps were left and many very large trees are scattered all along the ridge as emergents from the main canopy layer. There are trunks to ~~130~~ 1 m - 1.5 m. dbh., perhaps some more.

The lower part of the ridge was partially logged off 30-years ago. There are some scattered really large buttressed trees. A fair canopy with top at about ~~30~~ 30 m., of light requiring species about 3-4 ft. dbh. An indistinct lower layer at 6-10 m.. Ferns and shrubs fairly common, and

many climbers which become more abundant up the slope.

On the ridge top in the lower part the forest is rather poor and open forest, though with some large trees. An acaulescent caespitose palm, Eugeissonia with the habit of Nypa, and very spiny petioles is abundant along the ridge and to a lesser extent on the slopes below. In places it reaches 5-6 m even more m. tall. It makes up half a more of the shrub layer in most places, and almost all of it in the sparser areas on the lower ridge tops. Here in some areas the upper story trees do not even approach each other, but usually they are closer. Landon says that the sparseness is probably due to the presence of the palm the litter of which may have a deleterious effect on the soil, as they find it difficult to get trees started artificially in soil under these palms.

The first shorea cuticii is at about ~~450~~ 350 m. which indicates Symington's "hill dipterocarp forest". It is fairly common from here up to 500 m. (and probably further up).

The ridge ascends gradually and has generally a rather wide top 50-75 m. or more, in places narrower.

Above the sparse part that was somewhat logged the hill dipterocarp forest becomes rather good. The ~~co~~ main canopy is fairly ~~good~~ complete at about ~~25~~ ~~100~~ 30-40 m. with emergents up to ~~50~~ 50 m. and eventaller. The larger trees are up to 1.5 m. dbh a more spacing of canopy trees is from 10 to 20 m. There is an uneven lower story 10-20 m. high, rather well-marked, in places. The shrub layer is mostly Eugeissonia, but with some other shrubs. On the ground there is, where the Eugeissonia is not too thick, a good abundance of seedlings of shorea.

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These vary in size from those of this year. ~~10 cm~~ as tall, to older ones to 0.5 m. These latter correspond to places where more than usual light gets in. The seedlings, according to Landon, can live for up to 5 years in a semi-dormant condition, shooting up if a tree falls and lets in light.

The holes made in the forest by fallen trees are very impressive. Some seen must have been 30-50 m. long and 15-20 m. wide. Trees are said to fall even on very still days, such as today. One was heard at a distance. The holes persist for a long time if no seedlings are present to fill them. Landon says there may be a good seed year every 2-5 years

The trees making up the emergent and main canopy layer belong mainly to the following genera:

Shorea
Dipterocarpus
Kompassia
Anisoptera
Hopea
Nothopetalum (called seru, Borneo?)
Camphorosperma
Lindera
Gluta
Melanolepis
Swoda (glatra)
Calaquinon
Dyera (Jelutong)

Main story, not emergent:

Eugenia
Dillenia
Calophyllum
Myristica
Canarium
Sapium
Sandoricum
Sauraceae (one tree of)
Endospermum

One tree of Agathis alba at about ~~400~~ 350 m. first one seen in this region at such a low elevation.

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On the slope (25°-30°) below the 1600' point on the ridge is a plot laid out in 1948 by Wyatt-Smith for detailed study of a virgin rain-forest. In this 5 acres every tree over 4" is numbered, plotted on a diagram, measured every two years, records kept of flowering, etc. The plot is divided into 1 chain squares, basal area worked out for each of these. Found that maximum basal area seems to be about 180-200 sq.ft. per acre. Growth is rapid up to this, then slows or stops till a tree falls. This is figured to be the maximum the soil can support.

The average number of trees per acre is about 200. The average number of species is about 100 per acre. In the 5 acres there are about 200 species. This does not include those under 4" diameter.

On this plot the trees are generally smaller than on the ridge. Landon says they are usually smaller on the slope than either on the ridge or in valley bottoms.

The ground layer has a few ferns and Selaginella, a few seedlings.

The shrub layer has Eugeissonia common but not nearly so common as on ridge. There also is a sparse stand of slender shrubs of other sorts. This layer from 1-5m. high. The large trees are spaced about 10-20 m. apart. But few are over 6dm. dbh. Here and there are rather closely spaced groups of larger ones. The main canopy is at about 30-35 m., is rather open and uneven, and is of mostly of trees about 3dm. dbh.

Between the shrub layer and this is a rather vague layer or understory between 10 and 20 m., rather dense but grades into main canopy.

There are some enormous lianes but they are not abundant. Some small rattans. There are rather few epiphytes.

It is easy enough to walk through without cutting, being only careful

1956 Malaya

of spiny rattans and Eugeissonia trifolia.
Considerable light comes through in most places.

In general, in this hill dipterocarp forest, the canopy is rather loose, the layering is not very definite or easily made out, there are about 5-15 big trees per acre. (The foresters hope to have 25-30 in next generation)

April 19 - insects in bottle #2 collected around lights at Forest Research Institute rest house, Kepong, near Kualatumpur.

15 200